

DOCKET NO: 275181US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF

:

HARALD KELLER, ET AL.

: EXAMINER: SCHIRO, RYAN
RAYMOND

SERIAL NO: 10/544,780

:

FILED: AUGUST 8, 2005

: GROUP ART UNIT: 1792

FOR: METHOD FOR HYDROPHOBING
TEXTILE MATERIALS

:

APPEAL BRIEF (AMENDED)

This is an appeal to the Board of Patent Appeals and Interferences under 35 U.S.C. §134 taken from the April 20, 2009, Final Rejection of Claims 1-8, 10 and 12-18 of Application 10/544,780, filed August 8, 2005. A Notice of Appeal was timely filed on August 20, 2009, with a request for a one month extension of time.

STATEMENT OF REAL PARTY IN INTEREST

The real party in interest in this appeal is BASF Aktiengesellschaft, having an address of Ludwigshafen, Germany 67056, by virtue of an assignment recorded on October 29, 2007, at reel 020025 and frame 0931.

STATEMENT OF RELATED APPEALS AND INTERFERENCES

Appellants/Applicants, Appellants/Applicants' legal representative, and assignee, are aware of no appeals, interferences, judicial proceedings, or cases that are related to, directly affect or would be directly affected by, or have a bearing on the decision of the Board of Patent Appeals and Interferences in this appeal.

STATUS OF CLAIMS

Claims 1-8, 10 and 12-18 are active in this application.

Claims 9 and 11 were previously canceled during prosecution.

No claims are allowed.

No claims are withdrawn.

No claims are objected to.

Claims 1-8, 10 and 12-18 are finally rejected.

Claims 1-8, 10 and 12-18 are herein appealed.

Claim 19 was presented in an after-Final Request for Reconsideration and Amendment under 37 C.F.R. §1.116 on July 20, 2009; however, in an Advisory Action dated

August 7, 2009, the Examiner indicated that the Request for Reconsideration and Amendment was not entered. Thus claim 19 is not of record with respect to this appeal.

Amendments to claims 12-15 were presented in an Amendment under 37 C.F.R. §41.33(a) and §1.116(b)(2) on November 9, 2009. These amendments were entered by the Examiner in an Advisory Action dated November 18, 2009. These amendments are reflected in the Claims Appendix.

STATUS OF AMENDMENTS

Appellants/Applicants filed a Request for Reconsideration and Amendment under 37 C.F.R. §1.116 on July 20, 2009. In an Advisory Action dated August 7, 2009, the Examiner indicated that the Request for Reconsideration and Amendment was not entered. In the Advisory Action, the Examiner indicated that the proposed amendment(s) were not entered because “they are not deemed to place the application in better form for appeal by materially reducing or simplifying the issue for appeal; and/or … they present additional claims without canceling a corresponding number of finally rejected claims.” In the Advisory Action, the Examiner indicated that the request for reconsideration “has been considered but does not place the application in condition for allowance because … the Examiner contends that the references of Waeber and Kim are combinable (see Response to Arguments in Office Action dated 04/20/2009) and the slightly different solids content is obvious to modify.”

Claim 19 was presented in an after-Final Request for Reconsideration and Amendment under 37 C.F.R. §1.116 on July 20, 2009; however, in an Advisory Action dated August 7, 2009, the Examiner indicated that the Request for Reconsideration and Amendment was not entered. Thus claim 19 is not of record with respect to this appeal.

Amendments to claims 12-15 were presented in an Amendment under 37 C.F.R. §41.33(a) and §1.116(b)(2) on November 9, 2009. Claim 12 was amended to be dependent from Claim 8 and Claims 13-15 were amended for antecedent basis purposes in light of the amendment to Claim 12. These amendments were entered by the Examiner in an Advisory Action dated November 18, 2009. These amendments are reflected in the Claims Appendix.

SUMMARY OF THE CLAIMED SUBJECT MATTER

Independent Claim 1 is directed to a process for finishing textile materials comprising treating the textile materials with at least one aqueous liquor which comprises at least one organic polymer; at least one organic or inorganic solid in particulate form having a median (number average) particle diameter in the range from 1 nm to 350 nm; at least one emulsifier comprising at least one copolymer of ethylene and at least one α,β -unsaturated carboxylic acid or at least one anhydride of an α,β -unsaturated mono- or dicarboxylic acid; wherein the at least one organic or inorganic solid is present in the liquor in a fraction of at least 5.5 g/l. (Claims Appendix, Claim 1) (Evidenced by Specification, page 1, lines 5-8, page 8, lines 36-38, page 9, lines 28-30, and original claims 1 and 6).

Claims 2-4, 6, 7 and 16-18 depend directly from Claim 1. Dependent Claims 2-4, 6, 7 and 16-18 stand or fall with Claim 1.

Dependent Claim 5 is argued separately. Claim 5 limits the organic or inorganic solid(s) content of the liquor of Claim 1 to a fraction of at least 7 g/l (Claims Appendix, Claim 5) (Evidenced by Specification, page 7, lines 14-17, and original claim 5).

Independent Claim 8 is directed to aqueous liquors comprising at least one organic polymer and at least one organic or inorganic solid in particulate form having a median (number average) particle diameter in the range from 1 nm to 350 nm, and at least one

emulsifier selected from copolymers of ethylene and at least one α,β -unsaturated carboxylic acid or at least one anhydride of an α,β -unsaturated mono- or dicarboxylic acid, wherein the organic or inorganic solid or solids are present in the liquor in a fraction of at least 5.5 g/l. (Claims Appendix, Claim 8) (Evidenced by Specification, page 8, lines 36-38, page 9, lines 28-30, and original claims 6 and 8).

Claims 10 and 12-15 depend directly or indirectly from Claim 8. Dependent Claims 10 and 12-15 stand or fall with Claim 8.

There are no claims with means or step plus function language on appeal.

There are no drawings associated with the Application on appeal.

GROUNDS OF REJECTION TO BE REVIEWED

(1) Claims 1-4, 6-8, 10 and 12-18 stand finally rejected under 35 U.S.C. §103(a) as being unpatentable over “*Waeber*” (*Waeber et al.*, US 2005/0066448, published March 31, 2005) in view of “*Kim*” (*Kim et al.*, “Preparation of Ethylene-Modified Latex Using Ethylene-Acrylic Acid Resin,” *Macromol. Symp.* 151, 509-514, published 2000).

(2) Claim 5 stands finally rejected under 35 U.S.C. §103(a) as being unpatentable over *Waeber* in view of *Kim*.¹

ARGUMENT

¹ It is noted that Claim 5 is included with Claims 1-4, 6-8, 10 and 12-18 in the obviousness rejection as presented by the Office in the Office Action dated April 20, 2009. However, as Claim 5 is being argued separately, the arguments relating to Claim 5 (i.e., part (2)) have been separated from those relating to Claims 1-4, 6-8, 10 and 12-18 (i.e., part (1)).

(1) The rejection of Claims 1-4, 6-8, 10 and 12-18 under 35 U.S.C. §103(a) over *Waeber* in view of *Kim*

For clarity of the record, Appellants/Applicants note that independent Claim 1 will be addressed in the following remarks before independent Claim 8.

A. INDEPENDENT CLAIM 1 - PROCESS UTILIZING AQUEOUS LIQUOR(S)

(i) The Examiner erred in concluding that the claimed invention is *prima facie* obvious over the cited references

The Office asserts: “Waeber teaches a method for applying a finishing layer to a textile support material (abstract). Waeber also teaches a textile material that is coated with the finishing layer, as required by claim 7 (claims 19-22). The finishing layer is an aqueous mixture (0036) and can include crosslinked natural or synthetic hydroxyl, carbonyl, amino or thiol group containing polymers onto the textile material (0027). Hydrophobic silica particles, which are inorganic solids, having an average particle size of 5-100 nm are also set into the finishing layer, as required by claims 1, 2, 4, 6, 8, 10 and 12 (0034). The hydrophobic silica particles are present in the liquor in a fraction of 1.5-5 g/L, as required by claims 17 and 18 (Examples 1-8).” (Office Action dated April 20, 2009, ¶ 4).

The Office admits that “Waeber does not teach that an emulsifier is specifically included in the aqueous finishing liquor or that the solids are present in a 5.5-7 g/L amount.” (Office Action dated April 20, 2009, ¶ 5). Nonetheless, the Office looks to *Kim* in light of the stated deficiencies of *Waeber* and asserts that “*Kim* is drawn to the use of an ethylene-acrylic acid resin (EAA) as an emulsifier with organic polymers, such as polystyrene or polymethacrylate, as required by claims 1, 8, 10, 12 and 16 (Introduction).” (Office Action dated April 20, 2009, ¶ 6).

In view of the foregoing assertions by the Office with respect to *Waeber* and *Kim*, the Office concludes that (a) “It would have been obvious to a person ordinarily skilled in the art at the time of the invention to combine the teachings of *Waeber*, an organic polymer-solid material aqueous solution for finishing textile materials which is emulsified, with an emulsifier comprised of EAA that is used with organic polymers, as taught by *Kim* to make an organic polymer-solid material aqueous solution with an EAA emulsifier.” (Office Action dated April 20, 2009, ¶ 7), and (b) “It would have been obvious to a person ordinarily skilled in the art at the time of the invention that the solid could be in the aqueous composition in a fraction of 5.5-7 g/L, 0.1-100 g/L or 0.2-10 g/L, as required by claims 1, 5, 8, 10, 17 and 18. It is well settled in the determination of the optimum values for such as the solid fraction in the aqueous liquor is within the skill of one practicing in the art. *In re Boesch*, 205 USPQ 215 (CCPA 1980).” (Office Action dated April 20, 2009, ¶ 8).

Concerning (a), Appellants/Applicants submit that while it is *possible* to combine *Waeber* and *Kim*, there is no motivation to do so for the following reasons. The object of the claimed invention is to provide a process for finishing textile materials which are both water/soil repellent and have improved mechanical strength. Appellants'/Applicants' specification describes how textiles finished according to *Waeber*'s process have inferior mechanical strength (page 2, lines 1-11; WO 01/75216 is the foreign counterpart to the cited *Waeber* reference). Therefore, *Waeber* attains water/soil repellency at the expense of mechanical strength, which is the second desired property of the claimed invention.

Additionally, neither *Waeber* nor *Kim* discusses/suggests that the inclusion of an emulsifier (i.e., EAA) would improve mechanical strength. Accordingly, neither *Waeber* nor *Kim* recognizes the problems sought to be addressed by the claimed invention where a textile is produced having water/soil repellency, but also has improved mechanical strength. The Supreme Court has held that the discovery of a problem or a cause of a problem can lend

patentability to an invention. The discovery of a problem is often the key to making a patentable invention. Thus, the patentability of an invention under 35 U.S.C. §103 must be evaluated against the background of the highly developed and specific art to which it relates, and this background includes an understanding of those unsolved problems persisting in the art solved by the invention. *See, Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 43 S.Ct. 322, 67 L.Ed. 523 (1923). Accordingly, one would not be motivated to include the emulsifier of *Kim* in the aqueous liquor of *Waeber* in order to improve mechanical strength while maintaining sufficient water/soil repellency. Therefore, without motivation to combine *Waeber* and *Kim*, the Examiner has erred in concluding that the claimed invention is *prima facie* obvious over the combination of *Waeber* and *Kim*.

With respect to (b), Appellants/Applicants note that the Office refers to fractions such as “5.5-7 g/L, 0.1-100 g/L or 0.2-10 g/L” as relating to “claims 1, 5, 8, 10, 17 and 18” and the solid fraction of the liquor (Office Action dated April 20, 2009, ¶ 8). It appears that the Office has confused the organic/inorganic solids content of the liquor of claims 1, 5, 8 and 10, with the fraction of emulsifier in the liquor of claims 17 and 18 (0.1-100 g/L and 0.2-10 g/L respectively). Furthermore, claims 1, 8 and 10 recite the organic or inorganic solids content of the liquor to be “at least 5.5 g/L”, not 5.5-7 g/L as alleged by the Office, and claim 5 recites the organic or inorganic solids content of the liquor to be “at least 7 g/L”, not 5.5-7 g/L as alleged by the Office.

Regarding the organic or inorganic solids content of the liquor being “at least 5.5 g/L” in independent claim 1, Appellants/Applicants submit that this limitation is not *prima facie* obvious in light of *Kim*’s silence with respect to such contents and *Waeber*’s disclosure of liquors containing up to 5 g/L. The ranges of “up to 5 g/L” (*Waeber*) and “at least 5.5 g/L” (Applicants’ claims) do not touch or overlap as required by MPEP 2144.05 for the obviousness of ranges (See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re*

Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)). Accordingly, without said overlap/touching of the claimed parameter's range, the Examiner has again erred in concluding that the claimed invention is *prima facie* obvious over the combination of *Waeber* and *Kim*.

(ii) The Examiner erred in concluding that the claimed invention is obvious over the cited references

Even if a *prima facie* case of obviousness in light of *Waeber* and *Kim* did exist, which it does not, Appellants/Applicants submit that (a) there is no disclosure/suggestion within the art to modify the solids content of the disclosed liquor to that which is claimed and (b) the combination of *Waeber* and *Kim* also fails to disclose/suggest the improved mechanical strength of the claims invention.

(a) Lack of Disclosure/Suggestion to Modify the Solids Content of the Liquor

Even if one skilled in the art were to introduce an emulsifier (e.g., EEA) into the liquor of *Waeber*, *Waeber* only discloses liquors containing solids up to 5 g/l (Aerosil R812S of Examples 2, 4, 7 and 8; see also Appellants'/Applicants' specification: page 2, lines 1-7). In contrast, Appellants/Applicants claim a solids content of the liquor being at least 5.5 g/l (see claim 1). Thus, the "preferred" working range as disclosed by *Waeber* would be 5.0 g/l or less, not 5.5 g/l or more as claimed by Appellants/Applicants. With this in mind, one skilled in the art would have no motivation to look above the "preferred" thresholds of 5 g/l. Furthermore, courts have held that where, as here, the prior art disclosure suggests the outer limits of the range of suitable values, and that the optimum resides within that range, and where there are indications elsewhere that in fact the optimum should be sought within that range (all examples), the determination of optimum values outside that range may not be obvious (*In re Sebek*, 465 F.2d 902, 175 USPQ 93, 95 (CCPA 1972)). Thus, without any

motivation to consider a solids content above 5.0 g/l, Appellants'/Applicants' claims are not rendered obvious. Accordingly, the Examiner erred in concluding that the claimed invention is obvious over the combination of *Waeber* and *Kim*.

(b) Combination of *Waeber* and *Kim* Does Not Render Obvious Improved

Mechanical Strength of Claimed Invention

In response to Applicants' remarks filed January 29, 2009, regarding improved mechanical strength of textiles obtained from the claimed process (reiterated below), the Office has dismissed such arguments because "the features upon which applicant relies (i.e., that the mechanical strength of the textiles obtained are improved) are not recited in the rejected claim(s)" (Office Action date April 20, 2009, ¶ 10).

Appellants/Applicants point out that the Office's insinuation that an improved/unexpected property of the claimed invention must be included in the body of the claims to be examined/considered relevant to patentability has no legal basis. Quite the opposite, *In re Corkill* and *In re Chupp* explain how *evidence*, not claim limitations, of unexpected or superior properties can rebut a *prima facie* case of obviousness (*In re Corkill*, 711 F.2d 1496, 226 USPQ 1005 (Fed. Cir. 1985); *In re Chupp*, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987)) (see also MPEP 716.02(a)).

Furthermore, to be given substantial weight in the determination of obviousness or non-obviousness, evidence of secondary considerations must be relevant to the subject matter as claimed, and therefore the examiner must determine whether there is a nexus between the merits of the claimed invention and the evidence of secondary considerations (*Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 305 n.42, 227 USPQ 657, 673-674 n. 42 (Fed. Cir. 1985), *cert. denied*, 475 U.S. 1017 (1986)). The term "nexus" designates a factually and legally sufficient connection between the objective evidence of non-

obviousness and the claimed invention so that the evidence is of probative value in the determination of non-obviousness (*Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 7 USPQ2d 1222 (Fed. Cir.), *cert. denied*, 488 U.S. 956 (1988) (see also MPEP §716.01(b))). Applicants submit the indication of improved mechanical strength (specification: paragraph bridging pages 11 and 12) is relevant to the subject matter as claimed and does not require that additional limitations be read into the claims. As such, the specification illustrates the superior effects provided by the presently claimed invention and would rebut even a *prima facie* case of obviousness.

The combination of *Waeber* and *Kim*, if one were inclined to combine them, which they would not be, does not disclose or suggest the improved mechanical strength of textiles obtained by Appellants'/Applicants' claims. Page 2, lines 3-6 and 9-10 of the specification describes: “The finishing process described in WO 01/75216 [*Waeber*] provides finishing layers in which the colloids are anisotropically dispersed in the dispersion medium in that the colloids are observed to become concentrated at the boundary layer between the finishing layer and the surrounding surface.” and “textiles finished by the process described in WO 01/75216 [*Waeber*] lack satisfactory mechanical strength in many cases.” (emphasis added)

In contrast, the paragraph bridging pages 11 and 12 of the specification explains the following: “Textile materials according to the present invention further exhibit very good mechanical strength. In the textile materials coated according to the present invention, the solid or solids used are isotropically or substantially isotropically distributed throughout the finishing coat, i.e., no concentration is observed in the boundary layer between the finishing coat and the surrounding atmosphere.” Thus, it is the Appellants/Applicants position that the combination of *Waeber* and *Kim* does not render obvious the improved mechanical strength of textiles obtained by Appellants'/Applicants' claims, especially in view of the alteration of the solids content of the liquor which neither reference alone or in combination discloses or

suggests. Accordingly, the Examiner erred in concluding that the claimed invention (i.e., independent Claim 1) is obvious over the combination of *Waeber* and *Kim*.

B. INDEPENDENT CLAIM 8 - AQUEOUS LIQUORS

Claim 8 is drawn toward the aqueous liquor already discussed above with respect to Claim 1 wherein said aqueous liquor is used in a treatment process of textile materials. Accordingly, the following arguments with respect to Claim 8 are *in addition to* those already presented above with respect to Claim 1 which are herein incorporated by reference.

As explained above in A(i) (specifically, pages 8-9), the combination of *Waeber* and *Kim* fails to provide a *prima facie* case of obviousness because neither reference, alone or in combination, discloses or suggests an aqueous liquor having an organic/inorganic solids content of at least 5.5 g/L (see e.g., claim 8), nevermind the use of such an aqueous liquor for finishing a textile material (see e.g., claim 1) having certain desired properties.

Furthermore, as explained above in A(ii)(a), even if a *prima facie* case of obviousness in light of *Waeber* and *Kim* did exist, which it does not, both of these references, alone or in combination, fail to disclose or suggest a modification of the solids content of the liquor of *Waeber* such that the claimed solids content is obtained. Accordingly, without a disclosure of the solids content of the aqueous liquor of Claim 8 and without a disclosure or suggestion to modify the solids content of the reference(s) to encompass that which is claimed, the combination of *Waeber* and *Kim* fails to render obvious the aqueous liquors of Claim 8. As such, the Examiner erred in concluding that the claimed invention (i.e., independent Claim 8) is obvious over the combination of *Waeber* and *Kim*.

(2) The rejection of Claim 5 under 35 U.S.C. §103(a) over *Waeber* in view of *Kim*

Claim 5 is dependent from Claim 1 and therefore includes all of the limitations of Claim 1. Furthermore, Claim 5 defines the solids content of the liquor to be “at least 7 g/L”

which is narrower than the recited content of “at least 5.5. g/L” in Claim 1. Accordingly, the following arguments with respect to Claim 5 are *in addition to* those already presented above with respect to Claim 1 which are herein incorporated by reference.

A. The Examiner erred in concluding that Claim 5 is *prima facie* obvious over the cited references

Appellants/Applicants submit that the solids content of the liquor of Claim 5 (i.e., ≥ 7 g/L) is not *prima facie* obvious in light of *Kim*’s silence with respect to such contents and *Waeber*’s disclosure of liquors containing up to 5 g/L. The ranges of “up to 5 g/L” (*Waeber*) and “at least 7 g/L” (Applicants’ claims) do not touch or overlap as required by MPEP 2144.05 for the obviousness of ranges (See *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990)). Accordingly, without said overlap/touching of the claimed parameter’s range, the Examiner has again erred in concluding that the claimed invention is *prima facie* obvious over the combination of *Waeber* and *Kim*.

B. The Examiner erred in concluding that Claim 5 is obvious over the cited references

Even if a *prima facie* case of obviousness in light of *Waeber* and *Kim* did exist, which it does not, Appellants/Applicants submit that (i) there is no disclosure/suggestion within the art to modify the solids content of the disclosed liquor to that which is claimed and (ii) the combination of *Waeber* and *Kim* also fails to disclose/suggest the improved mechanical strength of the claims invention.

(i) Lack of Disclosure/Suggestion to Modify the Solids Content of the Liquor

Even if one skilled in the art were to introduce an emulsifier (e.g., EEA) into the liquor of *Waeber*, *Waeber* only discloses liquors containing solids up to 5 g/l (Aerosil R812S

of Examples 2, 4, 7 and 8; see also Appellants'/Applicants' specification: page 2, lines 1-7). In contrast, Appellants/Applicants claim a solids content of the liquor being at least 7 g/l (see claim 5). Thus, the "preferred" working range as disclosed by *Waeber* would be 5.0 g/l or less, not 7 g/l or more as claimed by Appellants/Applicants. With this in mind, one skilled in the art would have no motivation to look above the "preferred" thresholds of 5.0 g/l. Furthermore, courts have held that where, as here, the prior art disclosure suggests the outer limits of the range of suitable values, and that the optimum resides within that range, and where there are indications elsewhere that in fact the optimum should be sought within that range (all examples), the determination of optimum values outside that range may not be obvious (*In re Sebek*, 465 F.2d 902, 175 USPQ 93, 95 (CCPA 1972)). Thus, without any motivation to consider a solids content above 5.0 g/l, Appellants'/Applicants' claims are not rendered obvious. Accordingly, the Examiner erred in concluding that the claimed invention is obvious over the combination of *Waeber* and *Kim*.

(ii) Combination of *Waeber* and *Kim* Does Not Render Obvious Improved Mechanical Strength of Claimed Invention

As the argument presented in Part (1)B(ii) above is not changed due to the difference in solids content of claim 5, Part (1)B(ii) is herein incorporated by reference in order to minimize redundancy.

As such, just as was the case in Part (1)B(ii) above, it is the Appellants/Applicants position that the combination of *Waeber* and *Kim* does not render obvious the improved mechanical strength of textiles obtained by Appellants'/Applicants' claims, especially in view of the alteration of the solids content of the liquor which neither reference alone or in combination discloses or suggests. Accordingly, the Examiner erred in concluding that the claimed invention is obvious over the combination of *Waeber* and *Kim*.

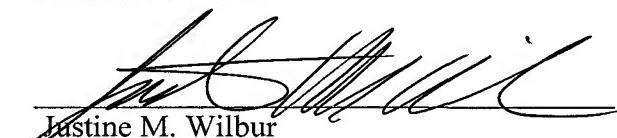
CONCLUSION

For the reasons stated herein, the combination of *Waeber* and *Kim* does not render obvious the claimed invention; therefore:

- (1) The Final Rejections of Claims 1-4, 6-8, 10 and 12-18 under 35 U.S.C. §103(a) should be reversed; and
- (2) The Final Rejection of Claim 5 under 35 U.S.C. §103(a) should be reversed.

Respectfully submitted,

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CLAIMS APPENDIX

Claim 1: A process for finishing textile materials comprising treating the textile materials with at least one aqueous liquor which comprises at least one organic polymer, at least one organic or inorganic solid in particulate form having a median (number average) particle diameter in the range from 1 nm to 350 nm, at least one emulsifier comprising at least one copolymer of ethylene and at least one α,β -unsaturated carboxylic acid or at least one anhydride of an α,β -unsaturated mono- or dicarboxylic acid, wherein the at least one organic or inorganic solid is present in the liquor in a fraction of at least 5.5 g/l.

Claim 2: The process according to claim 1, wherein the at least one organic or inorganic solid is hydrophobic.

Claim 3: The process according to claim 1, wherein the surface of the textile materials is provided with a bonding layer prior to said treating.

Claim 4: The process of claim 1, wherein the at least one organic or inorganic solid comprises at least one inorganic solid.

Claim 5: The process according to claim 1, wherein the at least one organic or inorganic solid is present in the liquor in a fraction of at least 7 g/l.

Claim 6: The process according to claim 1, wherein the at least one organic or inorganic solid comprises a particle diameter (median value, number average) in the range from 1 to 350 nm.

Claim 7: Textile materials finished according to the process of claim 1.

Claim 8: Aqueous liquors comprising at least one organic polymer and at least one organic or inorganic solid in particulate form having a median (number average) particle

diameter in the range from 1 nm to 350 nm, and at least one emulsifier selected from copolymers of ethylene and at least one α,β -unsaturated carboxylic acid or at least one anhydride of an α,β -unsaturated mono- or dicarboxylic acid, wherein the organic or inorganic solid or solids are present in the liquor in a fraction of at least 5.5 g/l.

Claim 9 (Canceled).

Claim 10: A process for preparing aqueous liquors according to claim 8 comprising mixing, to form the aqueous liquors, the following components:

at least one organic polymer,
at least one organic or inorganic solid in particulate form having a median (number average) particle diameter in the range from 1 nm to 350 nm,
at least one emulsifier comprising at least one copolymer of ethylene and at least one α,β -unsaturated mono- or dicarboxylic acid or at least one anhydride of an α,β -unsaturated dicarboxylic acid,
water, and
optionally at least one organic solvent and further components,
wherein the at least one organic or inorganic solid in particulate form is present in the aqueous liquor in a fraction of at least 5.5 g/l.

Claim 11 (Canceled).

Claim 12: A formulation comprising the aqueous liquor of claim 8.

Claim 13: The formulation of claim 12, further comprising at least one organic solvent.

Claim 14: The formulation of claim 12, further comprising water, wherein the water-fraction is not more than 15% by weight.

Claim 15: The formulation of claim 12, further comprising at least one organic solvent and water, wherein the water-fraction is not more than 15% by weight.

Claim 16: The process according to claim 1, wherein the at least one α,β -unsaturated carboxylic acid or the at least one anhydride of an α,β -unsaturated mono- or dicarboxylic acid is selected from the group consisting of acrylic acid, methacrylic acid, crotonic acid, maleic acid, fumaric acid, methylenemalonic acid, maleic anhydride, and itaconic anhydride.

Claim 17: The process according to claim 1, wherein the fraction of emulsifier in the liquor is from 0.1 to 100 g/l.

Claim 18: The process according to claim 1, wherein the fraction of emulsifier in the liquor is from 0.2 to 10 g/l.

EVIDENCE APPENDIX

Affidavits and Declarations

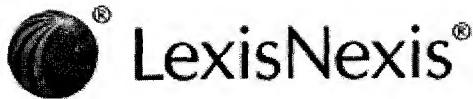
No Affidavit or Declaration is relied upon in support of the patentability of the claims in this appeal.

Other Evidence

- (1) *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 43 S.Ct. 322,67 L.Ed. 523 (1923).
- (2) *In re Sebek*, 465 F.2d 902, 175 USPQ 93, 95 (CCPA 1972).
- (3) *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 305 n.42, 227 USPQ 657, 673-674 n. 42 (Fed. Cir. 1985), *cert. denied*, 475 U.S. 1017 (1986).
- (4) *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 7 USPQ2d 1222 (Fed. Cir.), *cert. denied*, 488 U.S. 956 (1988).
- (5) *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).
- (6) *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).
- (7) *In re Corkill*, 711 F.2d 1496, 226 USPQ 1005 (Fed. Cir. 1985).
- (8) *In re Chupp*, 816 F.2d 643, 646, 2 USPQ2d 1437, 1439 (Fed. Cir. 1987).

None.

RELATED PROCEEDINGS APPENDIX



LEXSEE 261 US 45

EIBEL PROCESS COMPANY v. MINNESOTA & ONTARIO PAPER COMPANY.

No. 178.

SUPREME COURT OF THE UNITED STATES***261 U.S. 45; 43 S. Ct. 322; 67 L. Ed. 523; 1923 U.S. LEXIS 2527***

**Argued January 5, 8, 1923.
February 19, 1923, Decided**

PRIOR HISTORY: CERTIORARI TO THE CIRCUIT COURT OF APPEALS FOR THE FIRST CIRCUIT.

This was a bill in equity charging the infringement of a patent and seeking an injunction, an accounting and damages. The patent No. 845,224 issued to William Eibel, February 26, 1907. The application was filed August 22, 1906. The specifications describe the patent as for an improvement for Fourdrinier machines for paper making and say that it "has for its object to construct and arrange the machine whereby it may be run at a very much higher speed than heretofore and produce a more uniform sheet of paper which is strong, even, and well formed." The contention of the plaintiff, the petitioner here, is that the improvement was an important step in the art of paper making, and increased the daily product from twenty to thirty per cent.

The patent was held void by the District Court for the Western District of New York in the case of *Eibel Process Co. v. Remington-Martin Co.*, 226 Fed. 766 (1914). On appeal, the Circuit Court of Appeals for the Second Circuit reversed the decree of dismissal in the District Court, sustained the patent and found infringement of Claims Nos. 1, 2 and 3, but did not pass upon Claims Nos. 7, 8 and 12. 234 Fed. 624 (1910). The bill in the present case was filed in the District Court for Maine, January 1, 1917. That court in 1920 held the patent valid and entered a decree of injunction and for damages. 267 Fed. 847. On appeal, the Circuit Court of Appeals for the First Circuit reversed the decree and directed the dismissal of the bill. 274 Fed. 540 (1921). Because of the conflict in the two circuits, certiorari was granted to review the latter decree.

The Fourdrinier machine has for many years been well known and most widely used for making news print

paper. Its main feature is an endless wire cloth sieve passed over a series of rolls at a constant speed. The sieve known as the "wire" is woven with 60 or 70 meshes to the inch. It may be 70 feet or more in length and is often more than 100 inches in width. Its working surface with the total length of 70 feet is about 30 feet, the rest being taken up in the return of the wire underneath. At what is called the breast roll, at one end of the machine, there is discharged upon the wire from a flow box or pond, a constant stream of paper making stock of fibres of wood pulp mixed with from 135 to 200 times their weight of water of the consistency and fluidity of diluted milk. As this stream moves along the wire, the water drains through its meshes and the fibres are deposited thereon. The process is stimulated by a device of shake the wire with constant and rapid sidewise thrusts, forward and back, which insures the proper interlocking and felting of the stock as it progresses, the water continuing to drain from it. At the end of the surface length of the wire, the stock reaches what are called the couch rolls between which it is pressed and then in the form of a sheet of uniformly distributed pulp, felted sufficiently to hold together, it leaves the wire and is carried through a series of rolls or calendars by which the sheet is pressed and dried and from which it emerges to be rolled up as finished paper.

In the flow box or "pond" where the stream of pulp stock is stored there is a gate or door forming the end of the flow box called the "slice" by lifting which the stock is given the opportunity to flow upon the wire. The stream thus issuing is given a width of the desired sheet of paper and a depth regulated by the height to which the slice is lifted. The stream on the wire is prevented from flowing off the sides by "deckle straps" which are thick rubber bands, resting on each side of the wire at each side of the pulp. Travelling with the wire, they form

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lateral walls confining the stock till it is too dry to flow. Between the breast roll where the stream of liquid stock strikes the wire, and the couch rolls at the end of the surface length of the wire, there is a series of parallel horizontal rolls supporting the wire, called table rolls, and, twenty feet from the breast roll, there are placed under the wire and in contact with it, three suction boxes in succession, in which a partial vacuum is maintained, and through them is sucked out the greater part of the water remaining in the wet sheet of the pulp. Placed above the wire and just beyond the first suction box is what is called the "Dandy Roll," which is faced with wire cloth. Its office is to impress the upper surface of the forming sheet of paper and give it a texture similar to that which the lower surface of the paper has from its contact with the wire. It may also carry the design which is to give the watermark to the sheet if such a mark is desired. Beyond this is a larger roll called the guide roll, arranged with an automatic device varying its axis so as to keep the wire straight. From the guide roll the wire drops below the plane to the couch rolls already referred to.

These machines are very large, some of them weighing more than a million pounds, and their cost will range as high as one hundred twenty-five thousand dollars. They are run night and day in order that the capital invested in them may yield a proper return. Speed which increases production is therefore of the highest importance. Eibel's patent had for its avowed purpose the increase of this speed.

Eibel says in his specifications:

"My invention is embodied, essentially, in the first part or element of the machine having the Fourdrinier wire or paper-making wire, and consists in causing the stock to travel by gravity in the direction of movement of the making-wire and approximately as fast as the making-wire moves, thereby resulting in a "gravity-feed" for the machine. The stock may be and preferably is caused to travel more rapidly than the normal or usual speed of the making-wire for a certain grade of stock, and means are provided for increasing the speed of the machine so as to cause the making-wire to move at a higher rate of speed than usual, being substantially equal to the speed of the rapidly-moving stock. To accomplish this result in a simple manner, the breast-roll end of the paper-making wire is maintained at a substantial elevation above the level, thereby providing a continuous downwardly-moving paper-making wire, and the declination thus given to the wire is such that the stock is caused to travel by gravity in the direction of the movement of the wire and substantially as fast as the wire moves. The declination of the paper-making wire may be adjustable or the speed of the wire may be variable, or both the declination and speed of the wire may be adjustable, in order that the

velocity produced by gravity in the stock on the declining wire will approximately equal the speed of the wire. By this arrangement the speed of the machine may be increased to such an extent as to bring the speed of the making-wire up to the maximum velocity of the rapidly-moving stock and a strong, even and well-formed sheet produced which is more uniform than usual."

Two figures accompany the specifications of the Eibel patent. Figure No. 1 shows the wire of the Fourdrinier machine in outline from the breast roll to the guide and couch rolls, with a screw device for raising and lowering the breast roll and wire from the horizontal. The outline shows an elevation of the breast roll and wire so that the angle between the wire and the horizontal at the guide roll is about four per cent., which in a surface length of 30 feet would mean an elevation of 12 inches at the breast roll. The other figure No. 2 shows a device for regulating the speed of the wire applied at the lower couch roll.

Again the patentee says:

"For the purpose of increasing the speed of the machine to the maximum I maintain the breast-roll end of the making-wire at a high elevation above the level, so that the stock travels by gravity much faster than the making-wire ordinarily runs for a certain grade of stock, and I then increase the speed of the machine to such extent as to bring the rate of speed of the making-wire up to the speed of the rapidly-moving stock, and as a result the capacity of the machine is largely increased.

"I find in practice that by providing a gravity-feed operating substantially as herein described the stock runs smoothly and evenly without waving or rippling, and the fibers are thereby permitted to settle with great uniformity as regards their distribution over the wire, so that the paper in addition to being well formed is very uniform. Furthermore, as the stock is moving with the paper-making wire instead of being moved by the wire, or essentially by the wire, the formation of the paper will begin at the start and will continue to the end of the travel of the stock with the wire."

The claims in question are:

1. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a substantial elevation above the level, whereby the stock is caused to travel by gravity, rapidly, in the direction of movement of the wire, and at a speed approximately equal to the speed of the wire, substantially as described.

2. A Fourdrinier machine having the breast-roll end of the paper-making wire maintained at a high elevation, whereby the stock is caused to travel by gravity faster than the normal speed of the wire for a certain grade of stock, and having means for increasing the speed of the

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machine to cause the wire to travel at substantially the same rate of speed as the rapidly-moving stock, substantially as described.

3. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, the breast-roll end of the wire being maintained at a substantial elevation above the level, whereby the stock is caused to travel by gravity, rapidly, in the direction of movement of the wire and at a speed approximately equal to the speed of the wire, substantially as described.

7. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the suction-boxes supported at a corresponding declination, substantially as described.

8. A Fourdrinier machine having the paper-making wire declined from the breast-roll to the guide-roll, and the several suction-boxes arranged at different elevations, substantially as described.

12. In a Fourdrinier machine, a downwardly-moving paper-making wire, the declination and speed of which are so regulated that the velocity of the stock down the declining wire, caused by gravity, is so related to the velocity of the wire in the same direction, that waves and ripples on the stock are substantially avoided and the fibers deposited with substantial uniformity on the wire, substantially as described.

LAWYERS' EDITION HEADNOTES:

Evidence -- collateral implication -- weight. --

Headnote:

Implication of facts and conditions, falling from the mouths of witnesses, when only collateral to the exact point of inquiry for which they are called, is generally the most trustworthy evidence, because the result of the natural, so to say, subconscious adherence to truth, uninfluenced by a knowledge or perception of the bearing of the implication on the ultimate issue in the case.

Evidence -- weight -- usefulness of device within Patent Law. --

Headnote:

That a device for increasing the production in a certain industry has been generally adopted by manufacturers in the industry, and has increased the output at least 20 per cent, is weighty although not conclusive evidence to sustain the presumption that the discovery was new and useful within the meaning of the Patent Law.

[For other cases, see Evidence, II. k, 5, in Digest Sup. Ct. 1908.]

Patents -- validity -- Eibel's improvement in paper-making machine. --

Headnote:

Eibel's patent, No. 845,224, for improvement of a Fourdrinier paper-making machine, which raised the breast roll to give pitch to the forming wire, for the purpose of making the paper stock travel at approximately the speed of the wire, whereby the machine could be speeded up and the product increased while maintaining its quality, disclosed novelty and invention, and was valid.

[For other cases, see Patents, V. d, in Digest Sup. Ct. 1908.]

Patents -- principles in construing patent. --

Headnote:

In administering the Patent Law, the court first looks into the art, to find what the real merit of the alleged discovery or invention is, and whether it has advanced the art substantially; and if it has done so, the court is liberal in its construction of the patent to secure to the inventor the reward he deserves.

[For other cases, see Patents, XI. in Digest Sup. Ct. 1908.]

Patents -- slight advance in art -- narrow construction. --

Headnote:

If what a patentee has done works only a slight step forward, and that which he says is a discovery is on the border line between mere mechanical change and real invention, the patent, if sustained, will be given narrow scope, and infringement will be found only in approximate copies of the new device.

[For other cases, see Patents, XI. in Digest Sup. Ct. 1908.]

Patents -- construction of Eibel's patent for improvement in paper-making machine. --

Headnote:

The Eibel patent, No. 845,224, for improvement in the Fourdrinier paper-making machine, covers such machine in which the pitch of the paper-making wire is used as an appreciable factor, in addition to the factors of speed of the wire and the flow of the stock from the receptacle, theretofore known in the machine, in bringing about an approximation to the equal velocity of the stock and the wire at the point where, but for such approxima-

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tion, an injurious disturbance and ripples of the stock would be produced.

[For other cases, see Patents, XI. in Digest Sup. Ct. 1908.]

Patents -- definiteness -- sufficiency. --

Headnote:

Eibel's patent, No. 845,224, for an improvement in a Fourdrinier paper-making machine, is not rendered invalid because of the use of the terms "substantial" and "high" to designate the pitch which he gave to the wire for the purpose of avoiding irregularities in the texture of the product.

[For other cases, see Patents, VII. b, in Digest Sup. Ct. 1908.]

Patents -- anticipation -- what is. --

Headnote:

Accidental results, not intended and not appreciated, do not constitute anticipation in the Patent Law.

[For other cases, see Patents, V. e, 1, in Digest Sup. Ct. 1908.]

Patents -- use of same device for other purpose -- effect. --

Headnote:

That pitch of wire had been employed in a Fourdrinier paper-making machine to regulate the dryness of the stock at the Dandy roll did not prevent Eibel's use of greater pitch of wire to remedy irregularities in the paper, the cause of which was not perceived until he described it, from being patentable.

[For other cases, see Patents, V. b, 5, in Digest Sup. Ct. 1908.]

Patents -- Eibel's patent for machine. --

Headnote:

Eibel's patent, No. 845,224, for improvement in a paper-making machine, is for a machine, and not a process.

[For other cases, see Patents, XI. in Digest Sup. Ct. 1908.]

SYLLABUS

1. The Eibel patent, No. 845,224, for an improvement on Fourdrinier paper-making machines, whereby, mainly through a substantial elevation of the breast-roll end of the moving screen or "paper-making wire", the liquid stock discharged upon the screen acquires through gravity an additional speed, enabling it to keep pace with

the screen at the critical paper-forming point, thus avoiding injurious disturbances of the stock when the screen moves very rapidly, and making possible a much speedier production of good paper than was theretofore obtained from the machines without the improvement, -- held, a new and useful invention. P. 52.

2. The prompt and general adoption of the improvement, with increased productivity of the machines to which it was applied, is strong evidence of its novelty and usefulness. P. 56.

3. Previous adoption of a comparatively slight pitch of the screen, but for another and distinct purpose, did not constitute anticipation of this invention. P. 58.

4. Oral evidence of prior discovery must be clear and satisfactory to sustain an attack on a patent. P. 60.

5. A patent for a very meritorious improvement on an old machine, substantially advancing the art, is entitled to a liberal construction. P. 63.

6. In this case; the patent is construed to cover a Fourdrinier machine in which the pitch of the wire screen is used, not as the sole, but as an appreciable factor, in addition to those already present, in bringing about approximate equal velocity of stock and screen at the point where, otherwise, injurious disturbances of the stock would be produced. P. 659

7. General descriptive terms in a patent are not objectionable where it would have been difficult to make them more specific and where the description is sufficient to enable those skilled in the art to apply the invention. P. 65.

8. Accidental results, not appreciated, will not constitute anticipation. P. 66.

9. An increased elevation in the pitch of an element in a machine beyond that previously employed for another purpose is not mere matter of degree but amounts to invention when applied successfully to remedy an old defect in connection with the discovery of its cause. P. 66.

10. The novelty of an invention is not impeached by the fact that the same results may be achieved in a different way. P. 69.

11. The patent in this case, claims 1, 2, 3, 7; 8 and 12, were infringed by defendants. P. 69.

12. The first five of these are claims for a machine, and not a process. P. 70.

274 Fed. 540, reversed.

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COUNSEL: Mr. Frederick P. Fish, with whom Mr. Guy Cunningham and Mr. Harrison F. Lyman were on the briefs, for petitioner.

Mr. Amasa C. Paul, with whom Mr. Livingston Gifford, Mr. Richard Paul, Mr. Maurice M. Moore and Mr. Nathan Heard were on the briefs, for respondent.

OPINION BY: TAFT

OPINION

[*52] [**324] [***528] MR. CHIEF JUSTICE TAFT, after stating the case as above, delivered the opinion of the Court.

The evidence in the case establishes that before Eibel entered the field, continued high speeds in the wire of the Fourdrinier machine much beyond five hundred feet a minute resulted in defective paper. Eibel concluded that this was due to the disturbance and ripples in the stock as it was forming at a point between the breast roll and the first suction box, caused by the fact that at that point the wire was travelling much faster than the stock, and that if at that point the speed of the flowing stock could be increased approximately to the speed of the wire, the disturbance and rippling in the stock would cease and the defects would disappear from the paper product. Accordingly he proposed to add to the former speed of the stock by substantially tilting up the wire and giving the stock the added force of the down hill flow. He thought that as long as he could thus maintain equality of speed between stock and wire at the crucial point, and prevent the disturbance and rippling there, a further increase in the speed of the wire would not result in a defective product. He confirmed this by actual trial.

The first and most important question is whether this was a real discovery of merit. The Circuit Court of Appeals thought not. The prior art and the obvious application of the principle that water will run down hill in their opinion robbed it of novelty or discovery. The issue is one largely of evidence.

The plaintiff below introduced the patent and some evidence of infringement and a single expert to explain the discovery and invention and rested. Then the defendant brought in a mass of evidence to show prior discovery and use, to impeach the utility of plaintiff's alleged invention and to demonstrate the indefiniteness of specification and claims. The fact that the adjudication of the [*53] validity of the patent would impose a royalty on many of the paper manufacturers of the country who were not already licensees of the plaintiff led to the defendant's sending a circular letter to awaken the interest and secure the help of all so situated. This, as the record shows, had the effect to invoke offers of testimony on the

critical points in the case from the unlicensed part of the trade. The plaintiff adduced a few witnesses in rebuttal as to particular details and the same expert as in chief. The plaintiff's case as presented on the record is largely the presumption of validity and novelty attaching to the patent and such evidence as comes from defendant's witnesses. A case that can be made out in all its elements by cross-examination of opposing witnesses is a strong case. Implication of facts and conditions falling from the mouths of witnesses when only collateral to the exact point of inquiry for which they are called is generally the most trustworthy evidence because the result of the natural, so to say, subconscious adherence to truth uninfluenced by a knowledge or perception of the bearing of the implication on the ultimate issue in the case.

A thorough examination of the whole voluminous record produces a satisfying conviction, [**325] first, that for years news print paper makers and manufacturers of paper-making machinery were engaged in seeking a method of increasing the speed of the news print machines, and that they had succeeded by improving the stock and by strengthening the parts in bringing the speed of the wire and the delivered paper up to between five and six hundred feet a minute, but that, when these high speeds were attained and maintained for any length of time, though they served to enable manufacturers to advertise such maximums, their continued and regular operation showed defects in the paper which were only overcome by a reduction of speed to something less than five hundred feet. As against advertisement, and the exuberant [*54] memory of witnesses, the actual contemporaneous record of daily figures of production whenever brought to light justifies this conclusion. A leading manufacturer, one of the most enthusiastic witnesses on the subject of speed before Eibel, produced a memorandum of a visit he made in October, 1904, less than two years before Eibel's application, to see the operation of a machine he had [***529] manufactured which he called "the banner installation of the world" and made an entry in his diary, "Grand Sight -- 475 feet." There is the usual unconscious straining of memory without written record carried back ten or fifteen years, but the evidence on the whole is satisfying that the practical speed for the regular production of good news print paper never much exceeded that speed which had gratified the pride of this witness. A typical case is in that of machines made by Bagley & Sewall, large manufacturers of paper-making machines for the Laurentide Paper Company. The president of Bagley & Sewall testified that the speed of the machine was 552 feet a minute with satisfactory paper, and that he visited Laurentide in October, 1904, and counted the revolutions himself. He produced a letter from Mr. Chahoon, of the Laurentide Company, of about the same date, confirming his statement of the count and the satisfactory product, and an advertisement of Bagley

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& Sewall to the same effect of January, 1905. In rebuttal, a monthly record of the work of the machine is produced by the foreman at Laurentide for this same machine from January, 1905, to December, 1906, showing the speed to vary from a maximum of 518 in 1905 to 475 in 1908, with a general average of less than 500, and an explanation that the high speeds did not make a good product and were reduced. Our conclusion is confirmed, and indeed the importance of the issue of fact as to maximum speed before Eibel is minimized, by the circumstance, uncontested, that the owners of these fastest machines, at once upon Eibel's publication [*55] of his discovery, adopted his pitch and increased their product.

What Eibel tried to do was to enable the paper maker to go to six or seven hundred feet and above in speed and retain a good product. Did he do it? Eibel was the superintendent of a paper mill at Rhinelander, Wisconsin. Before August, 1906, he raised the pitch of the wire from two or three inches to twelve inches and greatly increased the speed with a satisfactory product, and in that month he applied for a patent. The defendant's witnesses without exception refer to that disclosure as something that surprised and startled the paper-making trade. It spread, to use the expression of one witness, like wild fire. There were those who hesitated to take the venturesome step to give such an unheard-of pitch to the wire and waited until others assumed the risk, but the evidence is overwhelming that within a short interval of a year or two all of the fast machines were run with wires at a pitch of twelve inches and that this pitch has been increased to fifteen and eighteen and even twenty-four inches, that the speed of the machines with satisfactory product has increased to six hundred, six hundred and fifty, and even seven hundred feet, with plans now even for a thousand feet and that the makers of two-thirds of the print paper of the country are licensees of Eibel.

Defendant attempts to break the effect of this evidence by showing that five of the largest paper manufacturers who are licensees of Eibel are also shareholders in the Eibel Process Company, the plaintiff, and that they make 2200 tons of the 5000 tons of paper made daily in the United States. This circumstance seems to have had influence with the Circuit Court of Appeals. There are, however, ten other paper-making companies, not shareholders, who are licensees and use the Eibel pitch, and whose aggregate production is 1200 tons a day; and what is equally significant, thirteen other companies have contributed [*56] to a fund to help in resisting the establishment of the right of Eibel to claim a royalty for the use of this high or substantial pitch of the wire in the making of paper. Presumably they too find it wise to use the Eibel pitch. The paper makers in this country who do not use the Eibel pitch, therefore, are few. It can hardly

be that dividends on the shares of stock in the Eibel Company held by the five large companies would furnish motive enough for them to continue to be licensees and to use something that was not of great advantage to them in their chief business of making paper; and certainly no such motive would explain the action of the licensees who are not stockholders or that of the infringers, in continuing to use the Eibel pitch. It should be said that one of the large manufacturers of paper-making machinery called by the defendant said that since 1907 he had not installed a single machine without the Eibel pitch.

[**326] The fact that the Eibel pitch has thus been generally adopted in the paper-making business and that the daily product in paper making has thus been increased at least twenty per cent. over that which had been achieved before Eibel is very weighty evidence to sustain the presumption from his patent that what he discovered and invented was new and useful. Of course, although very persuasive, it is not conclusive and may be explained. This brings us to the consideration of the [***530] evidence of the prior art and the contention of the defendant, and the conclusion of the court below, that the step taken by Eibel, so far as he took one, was a mere obvious application of fully developed devices in the prior art.

Eibel in his patent gives this measure of the prior art:

"The Fourdrinier wire has usually been arranged to move in a horizontal plane, although I am aware that means have been provided for adjusting the breast-roll end of the wire to different elevations, usually below the level, to provide for running with different grades of [*57] stock -- as, for instance, with quick stock and slow stock; but so far as I am aware the making-wire has always had to perform the work of drawing along the stock, and as the wire moved much faster than the stock the stock waved or rippled badly near the breast roll end of the wire, which gradually diminished until an equilibrium was established and a smooth, even, and glassy surface presented, and not until the waving or rippling ceased did the fibers lay down uniformly and produce a well-formed sheet of paper. The machine has been run necessarily at a slow rate of speed to give ample time for the water to escape and for the fibers to lay down so as to make a uniform sheet, and in case the time was insufficient the breast-roll end of the wire has been lowered still farther until the desired result was accomplished. In accordance with my invention I operate entirely above the level to cause the stock to travel by gravity at a velocity approximately equal to the speed of the making-wire, which I believe to be a new principle of operation."

It is important that the stock when it reaches the "Dandy" roll beyond the first suction box of the machine, shall be, on the one hand, free enough of water to be a

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formed sheet and take an impression from the Dandy roll, and on the other than it shall not be so dry that it will not retain the impression. Paper of such a heavy composition of fibre and water that it holds water long is said to be slow stock. Paper of lighter and thinner composition parting with water easily and drying quickly is called quick stock. Various means were adopted to give the stock the proper degree of dryness at the Dandy roll, usually by adjustment of the composition of the stock. What Eibel describes in this reference was another means. It was not widely used however. It was a slight depression or elevation in the wire at the breast roll so that slow stock could be made to run up hill from the flow box to the Dandy roll, lengthening the time of [*58] the movement and thus giving more opportunity in its progress for the needed draining of the stock. On the other hand, fast or thin stock from which the water flowed too easily could be made to retain sufficient water by hastening its progress to the Dandy roll by the down-hill tilt of the wire. This tilt was obtained by raising the breast roll end of the wire either by putting shimming blocks under that end of the machine or by special devices to be described. The sole object was greater or less drainage of stock for the Dandy roll. The Eibel invention is distinguished from the prior art in two ways, first, in that the pitch of the wire was for a different purpose to be accomplished, not at the Dandy roll some twenty or more feet from the breast roll, but at a point only nine or ten feet from there, and, second, by the fact that to achieve his purpose a high or substantial pitch must be given to the wire, while only a small or trivial pitch was needed for the drainage of the prior art.¹

1 It is true that defendant's expert Carter points out that in some of the machines of the prior art in which means were provided for tilting up the wire, the tilting was confined to that part of the surface length covered by the shake frame, say 18 feet, and did not extend to the first suction box, whereas Eibel's tilting involved the entire surface length of thirty feet. It would follow from this that the elevation of three inches in such machines would mean a greater angle of declination than three inches for the full surface length and that the disparity between three inches and twelve inches was not so great as the figures would lead one to think. But whatever difference this might make, the fact remains that Eibel's pitch was substantially greater than anything in the prior art.

This difference in purpose and degree of pitch between Eibel's device and the prior art is quite clearly shown by reference to a patent granted to Barrett and Horne, assignors to J. H. Horne & Sons, one of the important manufacturers of paper machinery of the country, in 1899. Their specifications showed a device capable of

elevating the breast roll less than three inches and its sole purpose was for drainage. Their specifications say:

[*59] "In certain kinds of pulp, notably the wood pulp which is now largely used in making paper, the water drains away very rapidly, so that the pulp may become nearly dry before it leaves the shake-frame, and thus not be properly laid when it reaches the [***531] rollers. This tendency may be obviated to a considerable extent by downwardly inclining the shake frame toward the rollers, so that the water tends to travel along with the pulp and will not, therefore, drain out through the wire so rapidly. It is further desirable that the amount of inclination or slope should be variable, so as to adapt the machine for pulp of different kinds or grades."

The Bayliss Austin machine, one of three chiefly relied on to show prior use, was made by the Horne Company and was designed by Barrett and Horne on the model of this patent. [**327] It is very clear from an examination of the design and contract for this machine that the pitch of the wire in it could not have exceeded three inches and that it was used for drainage. Other patents were set up in defense, some of them showing devices for raising the breast roll and wire above the level, and lowering them below the level for the purpose of drainage. The angle of elevation and depression was always small. There was a constant straining by the witnesses for the defense to increase the elevation before Eibel. On the direct examination they began with a positive assertion that a pitch of four, five, and even six inches, had been used in certain machines before Eibel's time, but written records, contracts and specifications brought out on cross-examination show nothing more than three inches provided for purpose of drainage and not more than that was used. This is not to say that witnesses in the face of such records did not testify to a higher elevation, but in such cases the amount of elevation rested in memory running back more than ten or fifteen years, a memory stimulated by the subsequent high pitches of Eibel and the retrospect of the [*60] progress that now seems so easy and clear to every one. There was, too, always indefiniteness as to when such increase in elevation of the wire had taken place, whether before or after August, 1906, Eibel's date, and there was no evidence of weight, we think, after a full examination of the record, sufficient to justify a finding that such elevations had ever exceeded three inches before his application.

This is confirmed by the fact that greater elevation was not needed for the purpose of drainage for which it was devised and used. It is true that some witnesses testify that they realized before Eibel's application that speeding up the stock to equal velocity with the wire would solve the difficulty and aid the speed. But there is not a single written record, letter or specification of prior

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date to Eibel's application that discloses any such discovery by anyone, or the use of the pitch of the wire to aid the speed of the machine. The oral evidence on this point falls far short of being enough to overcome the presumption of novelty from the granting of the patent. The temptation to remember in such cases and the ease with which honest witnesses can convince themselves after many years of having had a conception at the basis of a valuable patent, are well known in this branch of law, and have properly led to a rule that evidence to prove prior discovery must be clear and satisfactory. *Barbed Wire Patent Case*, 143 U.S. 275, 284, *Loom Co. v. Higgins*, 105 U.S. 580, 591. Indeed when we consider the indisputable fact that Eibel's successful experiment at Rhinelander and his application for a patent surprised the whole paper trade, and that for a short time many held back from risking so radical a change and then all adopted it, oral evidence that some persons had discovered the source of trouble and the means of remedying it some years before Eibel is incredible. We are confirmed in this conclusion by the finding of Judge Hale in the District Court which is not [*61] offset by the reversal of his decree in the Circuit Court of Appeals because that court seems to have reached its conclusion chiefly on other grounds yet to be considered.

The defendant's counsel contend that the specifications of the Eibel patent require that the only force to be used in giving speed to the stock shall be the force of gravity created by the angle of down hill inclination of the wire. They say that the patentee mentions no other means of acceleration, that he must be confined to this, and that a machine which uses other factors for this purpose does not infringe. We do not understand the Circuit Court of Appeals to go quite so far, but it does seem to give a construction requiring the force of gravity caused by the pitch of the wire to be the predominating cause of the increased speed of the stock. The factors of speed of the stock in such a machine before the factor of pitch was applied to increase it, were the head or hydraulic pressure of the stock in the flow box behind the slice, imparting movement to it as it came out on to the wire under the lifted slice, and the carrying effect of the moving wire upon the fluid stock as it [**532] fell upon the wire and proceeded gradually to form into a web as the fibres were laid and the water drained.

Many calculations were made by defendant's expert Carter, based on the laws of hydraulic pressure and flow, to show that under varying conditions of head and pitch and the speed of the wire, the chief factor would be head, the next the "drag" or carrying effect of the wire and the least in degree and importance in making the velocity of the stock and the wire equal would be the pitch, and that Eibel's invention could not be present because the "drag" of the wire and its influence upon the speed of the stock

must be eliminated under Eibel's specifications. We do not so understand it. As the stock descends upon the wire with the head of the flow box, it is thin and liquid, the wire at its greater speed necessarily imparts additional [*62] speed to the stock and in its unformed fluidity the added speed does not disturb or ripple the stock to the injury of the process of paper making. It is only after the stock proceeds a third or a half of the surface length of the wire that the point is reached where the overspeed of the drag becomes troublesome in the felting or formation of the web of the pulp. Before that point is reached, the "drag" may be useful [**328] in bringing the speed of the stock nearer to that of the wire without injury. The truth seems to be, and this is brought out with force in the testimony of the defendant's expert witness Livermore, that while it is possible to calculate to a nicety the velocity of the free flowing liquid stock due to head and pitch, when unaffected by drainage, variation in viscosity and fluidity and the like, yet when these conditions are present, as they always are, and the other less calculable factor of the drag of the wire enters the problem, there is no means, short of actual experiment, to enable one to anticipate results and it is quite impossible to apportion to each factor its real influence. This fact reflects on the question whether Eibel's discovery was invention rather than the mere obvious and simple application of known natural forces.

The defendant introduced expert evidence to show that with a head of 2 1/4 inches in the flow box and a speed of 585 feet to the minute in the wire, and excluding the factor of "drag" of the wire, it would require an elevation of 48 inches to make up the difference in speed of the stock given by the head and the speed of the wire at a distance 10 feet from the point of discharge on the wire. The conclusion drawn from this seems to be that as no practical machine uses 48 inches pitch, the Eibel invention has never been used or infringed. Disregarding its error in omitting necessary factors already adverted to, this reasoning seems to us to depend on too narrow a construction of the patent.

[*63] In administering the patent law the court first looks into the art to find what the real merit of the alleged discovery or invention is and whether it has advanced the art substantially. If it has done so, then the court is liberal in its construction of the patent to secure to the inventor the reward he deserves. If what he has done works only a slight step forward and that which he says is a discovery is on the border line between mere mechanical change and real invention, then his patent, if sustained, will be given a narrow scope and infringement will be found only in approximate copies of the new device. It is this differing attitude of the courts toward genuine discoveries and slight improvements that reconciles the sometimes apparently conflicting instances of

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construing specifications and the finding of equivalents in alleged infringements. In the case before us, for the reasons we have already reviewed, we think that Eibel made a very useful discovery which has substantially advanced the art. His was not a pioneer patent, creating a new art; but a patent which is only an improvement on an old machine may be very meritorious and entitled to liberal treatment. Indeed, when one notes the crude working of machines of famous pioneer inventions and discoveries, and compares them with the modern machines and processes exemplifying the principle of the pioneer discovery, one hesitates in the division of credit between the original inventor and the improvers; and certainly finds no reason to withhold from the really meritorious improver, the application of the rule "ut res magis valeat quam pereat," which has been sustained in so many cases in this Court. *Winans v. Denmead*, 15 How. 338, 341; *Corning v. Burden*, 15 How. 265, 269; *Turrill v. Railroad Co.*, 1 Wall. 491, 510; *Rubber Co. v. Goodyear*, 9 Wall. 788, 795; *McClain v. Ortmayer*, 141 U.S. 419, 425.

Eibel was an avowed improver, not in the art of paper making generally, but upon a well-known and universally [*64] used machine. In that machine, the speed [***533] of the stock which was the subject matter of his improvement, had always been controlled by two factors, the head of the stock in the flow box, and the carrying effect of the under moving wire. He says nothing in his specifications to exclude these factors, he merely adds another factor of speed to secure the equality of speed of the stock with the wire. He says:

"For the purpose of increasing the speed of the machine to the maximum I maintain the breast-roll end of the making-wire at a high elevation above the level, so that the stock travels by gravity much faster than the making-wire ordinarily runs for a certain grade of stock, and I then increase the speed of the machine to such extent as to bring the rate of speed of the making-wire up to the speed of the rapidly-moving stock, and as a result the capacity of the machine is largely increased."

We agree fully with Judge Hale in the District Court in his comment on this:

"The process invented by him (Eibel) begins to operate after the stock has entered upon the wire. His apparent attempt was to get rid of bubbles and wrinkles, before he got to the place on the machine where the paper is formed. To do this, he allowed gravity to work with 'drag' and with 'head.' He harnessed all the elements he could find. He brought gravity in with the other elements, and so brought the speed of the stock up to equality with that of the wire. By this means he achieved high speed and also freed the stock on the wire from waves and ripples." 267 Fed. 855.

The Circuit Court of Appeals questions the assumption that gravity was a new factor with Eibel, because the head of the flow box is only another application of the force of gravity. This is a mere criticism of a term which whether accurate or not is not misleading. What Eibel was dealing with in his patent as a new factor was the additional [*65] [**329] force acquired by the pitch of the wire and that he called gravity, and Judge Hale in the passage quoted uses the word with the same meaning and without any confusion to the reader.

We think, then, that the Eibel patent is to be construed to cover a Fourdrinier machine in which the pitch of the wire is used as an appreciable factor, in addition to the factors of speed theretofore known in the machine, in bringing about an approximation to the equal velocity of the stock and the wire at the point where but for such approximation the injurious disturbance and ripples of the stock would be produced.

The next objection to the patent which prevailed in the Circuit Court of Appeals is that its terms are too vague because the extent of the factor of pitch is not defined except by the terms "substantial" and "high". The figure accompanying the specification and illustrating the improvement indicates an angle of four per cent. or an elevation of 12 inches, and the reference to the small elevations for drainage shown in earlier devices indicates that the patentee had in mind elevations substantial as compared with them in order to achieve his purpose of substantially increasing the speed of the stock. It was difficult for him to be more definite, due to the varying conditions of speed and stock existing in the operations of Fourdrinier machines and the necessary variation in the pitch to be used to accomplish the purpose of his invention. Indefiniteness is objectionable because the patent does not disclose to the public how the discovery, if there is one, can be made useful and how its infringement may be avoided. We do not think any such consequences are involved here. This patent and its specifications were manifested to readers who were skilled in the art of paper making and versed in the use of the Fourdrinier machine. The evidence discloses that one, so skilled, had no difficulty, [*66] when his attention was called to their importance, in fixing the place of the disturbance and ripples to be removed, or in determining what was the substantial pitch needed to equalize the speeds of the stock and wire at that place. The immediate and successful use of the pitch for this purpose by the owners of the then fastest machines and by the whole trade is convincing proof that one versed in paper making could find in Eibel's specifications all he needed to know, to avail himself of the invention. Expressions quite as indefinite as "high" and "substantial" in describing an invention or discovery in patent specifications and claims have been recognized by this Court as sufficient.

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In *Tilghman v. Proctor*, 102 U.S. 707, the claim sustained was for "the manufacturing of fat acids and glycerine from fatty bodies by the action of water at a high temperature and pressure." See also *Rubber Co. v. Good-year*, 9 Wall. 788, 794; *Mowry v. Whitney*, 14 Wall. 620, 629; *Lawther v. Hamilton*, 124 U.S. 1, 9; *Carnegie Steel* [***534] *Co. v. Cambria Iron Co.*, 185 U.S. 403, 436; *Abercrombie & Fitch Co. v. Baldwin*, 245 U.S. 198, 205.

It is contended on behalf of the defendant that whether Barrett and Horne perceived the advantage of speeding up the stock to an equality with the wire, yet the necessary effect of their devices was to achieve that result and therefore their machine anticipated Eibel. In the first place we find no evidence that any pitch of the wire, used before Eibel, had brought about such a result as that sought by him, and in the second place if it had done so under unusual conditions, accidental results, not intended and not appreciated, do not constitute anticipation. *Tilghman v. Proctor*, 102 U.S. 707, 711; *Pittsburgh Reduction Co. v. Cowles Electric Co.*, 55 Fed. 301, 307; *Andrews v. Carman*, 13 Blatchf. 307, 323.

It is next objected that the alleged invention covers only a matter of degree in pitch which can not be the subject of a patent. The prior art showed the application [*67] of gravity by use of the pitch of the wire to the improvement of the Fourdrinier machine and Eibel, it is said, merely increased degree of pitch and gravity for the same general purpose. We think this attack upon the patent can not prevail. Eibel's high or substantial pitch was directed toward a wholly different object from that of the prior art. He was seeking thereby to remove the disturbance and ripples in the formation of the stock about ten feet from the discharge, while the slight pitches of the prior art were planned to overcome the dryness in the formed web of the stock at double the distance from the discharge. It would seem that the greater speed of the stock produced by Eibel would make difficult the joint application of the principles of Eibel and Barrett and Horne, and that the function of adjusting the drainage for the Dandy roll must be carried on by some of the other methods known to the art when Eibel's pitch is used. But however this may be, the object of the one was entirely different from that of the other. Livermore an expert witness called by the defendant, when asked the question whether the purpose of the Barrett and Horne patent had anything in common with the theory of the Eibel patent, answered:

"I should say not. It looks to me as if Barrett and Horne referred to the adjustment of inclination with one effect in mind, and that Eibel referred to like adjustment with another [**330] effect in mind. . . . In this particular case, the two effects have, so far as I can see, no special correlation to one another, and an adjustment made

with one effect in mind might or might not produce a desirable effect as to the other function or phenomenon."

In considering this phase of the controversy, we must not lose sight of the fact that one essential part of Eibel's discovery was that the trouble causing the defective paper product under high machine speed was in the disturbance and ripples some ten feet from the discharge and that [*68] they were due to the unequal speeds of stock and wire at that point and could be removed by equalizing the speeds. The invention was not the mere use of a high or substantial pitch to remedy a known source of trouble. It was the discovery of the source not before known and the application of the remedy for which Eibel was entitled to be rewarded in his patent. Had the trouble which Eibel sought to remedy been the well known difficulty of too great wetness or dryness of the web at the Dandy roll and had he found that a higher rather than a low pitch would do that work better, a patent for this improvement might well have been attacked on the ground that he was seeking monopoly for a mere matter of degree. But that is not this case. On the other hand, if all knew that the source of the trouble Eibel was seeking to remedy was where he found it to be and also knew that increased speed of the stock would remedy it, doubtless it would not have been invention on his part to use the pitch of the wire to increase the speed of the stock when such pitch had been used before to do the same thing although for a different purpose and in a less degree. We can not agree with the Circuit Court of Appeals that the causal connection between the unequal speeds of the stock and the wire, and the disturbance and rippling of the stock, and between the latter and the defective quality of the paper in high speeds of the machine was so obvious that perception of it did not involve discovery which will support a patent. The fact that in a decade of an eager quest for higher speeds this important chain of circumstances had escaped observation, the fact that no one had applied a remedy [***535] for the consequent trouble until Eibel, and the final fact that when he made known his discovery, all adopted his remedy, leave no doubt in our minds that what he saw and did was not obvious and did involve discovery and invention.

The Circuit Court of Appeals dwells on the fact that the use of the pitch of the wire was not really the introduction [*69] of a new factor in the solution of the problem because the same result would have followed if the head of the flow box had been made greater in order to increase by gravity the speed of the stock. Doubtless this could have been done. There were difficulties, however, in such a method when Eibel's application was filed, because in the then machines the flow box was supported by an apron over the wire and the necessary addition to the weight of the stock in the flow box, in

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increasing the head, would have interfered with the free working of the wire. Since that time an improvement has been adopted by which the flow box does not rest on the wire and additional head can be imparted to the stock. The defendant invites attention to the fact that one or two paper makers are increasing this head and giving up the pitch, for the purpose of increasing the speed of the stock. We do not see that these circumstances in any way affect the validity of the Eibel patent. If defendant or others can do what Eibel accomplished in another way, and by means he did not include in his specifications and claims, i.e., by additional head and the abandonment of a substantial pitch, they are at liberty to do so and avoid infringement.

We come finally to the question of infringement. If the Eibel patent is to be construed as we have construed it, there can be no doubt that the defendant uses the Eibel invention. The device which the defendant uses for tilting the wire, i.e., by shimming blocks, and that for regulating and increasing the speed of the wire, are plainly equivalents of the same elements in the new combination which Eibel shows in his drawings and specifications. The defendant uses a Fourdrinier machine having the breast roll end of the paper-making wire maintained at an elevation of 15 inches above the level whereby the stock is caused to travel by gravity rapidly in the direction of the movement of the wire and at a speed approximately [*70] equal to the speed of the wire substantially as described. This brings the defendant's machines within the first claim of the patent if 15 inches is a substantial elevation of the making wire, as all the witnesses concede that it is. The same conclusion must be reached as to the second claim because the defendant uses a machine "having the breast-roll end of the paper-making wire maintained at a high elevation, whereby the stock is caused to travel by gravity faster than the normal speed of the wire for a certain grade of stock, and having means for increasing the speed of the machine to cause the wire to travel at substantially the same rate of speed as the rapidly-moving stock, substantially as described." The same thing is true of the third claim.

Question has been made whether these three claims are for a machine or a process. [**331] We think they are claims for a machine, i.e., for an improvement on a machine, and that the devices for such improvement, to wit, the elevation by a screw or other equivalent method, and the control of the speed of the wire, are shown by the specifications and the figures, together with a sufficient description of their operation.

The seventh and eighth claims are for the same improvement with the suction boxes changed from their usual position in the unimproved machine to make them effectively function on the pitched wire. They are machine claims and are infringed by the defendant. Their new adjustment is part of a new combination and the words substantially as described limit them to a combination including the elements included in the first three claims.

Claim No. 12 is as follows:

"12. In a Fourdrinier machine, a downwardly-moving paper-making wire, the declination and speed of which are so regulated that the velocity of the stock down the declining wire, caused by gravity, is so related to the [*71] velocity of the wire in the same direction, that waves and ripples on the stock are substantially avoided and the fibers deposited with substantial uniformity on the wire, substantially as described."

This comes nearer to being a process claim but whether it is or not the defendant infringes it.

The evidence discloses that after the suit was brought, the defendant reduced the pitch of one of its machines to six inches and the contention of defendant is that the machine ran as well [***536] and gave as good results as when its pitch was 15 inches. We are not called upon to decide whether this contention can be sustained because the reduction was after the bill was filed. It may be noted, however, that the admissions of witnesses seem to show that this reduction was made for purposes of the suit and that immediately after the defendant won the suit in the Circuit Court of Appeals, it restored the pitch of this machine to 15 inches, and when the decree of the Circuit Court of Appeals proved not to be final, the wire was lowered again to a 6-inch pitch. Much evidence was taken and much discussion has followed upon the point whether a 6-inch pitch accomplishing in whole or in part what Eibel sought to do would infringe a patent for a substantial pitch. We do not find it necessary to pass definitely on the question because it is not before us on the record, though we can not prevent the natural inferences upon this point to be drawn from the conclusions we have reached.

The decree of the Circuit Court of Appeals dismissing the bill is reversed and the decree of the District Court is affirmed.

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In re SEBEK

U.S. Court of Customs and Patent Appeals

No. 8631

Decided August 31, 1972

465 F2d 904

Headnotes

PATENTS

[1] Evidence — Expert testimony (► 36.10)

Opinions of experts in the field, as contained in their publication, that values greater than five per cent would not be expected to be advantageous are entitled to consideration on question of obviousness.

[2] Patentability — Composition of matter (► 51.30)

While it may ordinarily be the case that determination of optimum values for parameters of a prior art process would be at least *prima facie* obvious, that conclusion depends upon what prior art discloses with respect to those parameters; where prior art disclosure suggests outer limits of range of suitable values, and that the optimum resides within that range, and where there are indications elsewhere that in fact the optimum should be sought within that range, the determination of optimum values outside that range may not be obvious; in area of technology shown to be highly unpredictable in process values, discovery of optimum values not in any way suggested by prior art is more likely to be unobvious than obvious within meaning of 35 U.S.C. 103.

Particular Patents

Particular patents—Beta-Carotene

Sebek, Method for Producing Beta-Carotene, claims 1 to 3 of application allowed.

Case History and Disposition

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Appeal from Board of Appeals of the Patent Office.

Application for patent of Oldrich K. Sebek, Serial No. 339,331, filed Jan. 22, 1964; Patent Office Group 170. From decision rejecting claims 1 to 3, applicant appeals. Reversed.

Attorneys

ROMAN SALIWANCHIK (JOHN KEKICH of counsel) both of Kalamazoo, Mich., for appellant.

S. WM. COCHRAN (JACK E. ARMORE of counsel) for Commissioner of Patents.

Judge

Before WORLEY, Chief Judge, and RICH, ALMOND, BALDWIN, and LANE, Associate Judges.

Opinion Text

Opinion By:

LANE, Judge.

This appeal is from the decision of the Board of Appeals sustaining the examiner's rejection of claims 1-3 of appellant's application¹ on the ground of obviousness (35 U.S.C. 103) over certain prior art. We reverse.

¹ Serial No. 339,331 filed January 22, 1964.

The invention is in the field of chemical synthesis of beta-carotene, a precursor of vitamin A. It had previously been known that beta-carotene could be produced by certain micro-organisms using an aqueous fermentation medium containing citrus molasses, a product obtained from whole citrus peel. Appellant contends that in the prior art processes, the level of citrus molasses was kept at or below 5% by weight of the fermentation medium in the belief that there was no benefit to be gained from the addition of greater quantities. It is asserted that the present invention is based on the discovery that at citrus molasses levels of at least 7-1/2%, the yield of beta-carotene is greatly and unexpectedly increased. In his specification, appellant reports the following data:

Table set at this point is not available. See table in hard copy or call BNA at 1-800-372-1033.

Appellant does not argue claims 1-3 individually, and claim 1, therefore, adequately defines the subject matter involved in this appeal. Claim 1 reads as follows:

In a method for microbiologically producing b-carotene in a submerged aerobic fermentation using [the micro-organism] Blakeslea trispora, the improvement which comprises incorporating at least about 7-1/2 per cent of citrus molasses in a b-carotene fermentation medium.

The examiner rejected claims 1-3 under 35

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U.S.C. 103 as unpatentable (1) Ciegler et al.² (hereinafter the Ciegler patent) in view of Hoffmann et al.³ (Hoffmann) and (2) Fulde⁴ alone or in view of the Ciegler patent. The Ciegler patent discloses the use of both citrus meal and citrus molasses in the fermentation medium, which is the same medium as that utilized by appellant, to increase the yield of beta-carotene. Tables I and II of the patent report the beta-carotene yields using citrus meal and citrus molasses respectively.

² U. S. Patent No. 3,079,380 issued February 26, 1963.

³ U. S. Patent No. 3,013,948 issued December 19, 1961.

⁴ U. S. Patent No. 3,291,701 issued December 13, 1966, on an application filed July 6, 1962.

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Table set at this point is not available. See table in hard copy or call BNA at 1-800-372-1033.

The Ciegler patent does not disclose the use of any level of citrus molasses greater than 5% by weight, although there is no express disclosure to the effect that such greater proportions could not be used.

Hoffmann is drawn to the production of vitamin B12 using a microorganism and fermentation process different from those disclosed in both the Ciegler patent and appellant's application. The examiner observed that in Hoffmann's examples, it appears that:

[W]ithin an optimum range their [sic] exists areas where a greater amount of precursor will produce smaller yields of the vitamin than a lesser amount of precursor while at other subsequent ranges a greater amount will produce larger yields of the vitamin.

The board stated that the examiner cited Hoffmann "purely for the purpose of argument to show the existence of anomaly in fermentation processes," and indeed, the examiner did use Hoffmann in that manner, concluding that from the knowledge of "this erratic behavior of microorganisms, it would be obvious to try the claimed amounts of citrus molasses in the Ciegler et al. process."

The board sustained the rejection based on the Ciegler patent and Hoffmann agreeing with the examiner that the determination of optimum amounts of citrus molasses would have been obvious

even though outside the range taught by the Ciegler patent.

Like the Ciegler patent, the Fulde patent is directed to the synthesis of beta-carotene through the fermentation of *Blakeslea trispora*, and the use of a variety of citrus peel materials, including citrus meal and citrus molasses, in the fermentation medium is disclosed. Although no suitable citrus molasses concentration is specified, the examples in Fulde utilize citrus *meal* levels of 4%, 18% and 25%. The examiner reasoned, and the board agreed, that in view of Fulde's teaching of equivalence between citrus molasses and citrus meal, the substitution of citrus molasses for citrus meal at the *citrus meal concentrations* utilized in the examples, would have been obvious to one of ordinary skill in the art. The Ciegler patent, in both the examiner's and board's view, reinforced the conclusion of obviousness.

It was appellant's position during prosecution of his application in the Patent Office, and in his position before this court, that the use of citrus molasses at levels of 7-1/2% and above is not suggested by the prior art and unexpectedly leads to higher yields of beta-carotene. Appellant contends that one of ordinary skill in the art would have been turned away from the use of greater than 5% citrus molasses. In support of that contention, appellant submitted a publication of Ciegler, Nelson and Hall⁵ (hereinafter the Ciegler publication), the three patentees of the Ciegler patent, which reports experimentation with various citrus materials. Based on data presented in the publication, the authors concluded that:

⁵ Ciegler et al., Enhancement of b-Carotene Synthesis by Citrus Products, 11 Applied Microbiology 128-31 (1963).

Citrus molasses enhanced carotenogen

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esis at concentrations from 0.1% to 1.0%; at higher concentrations there was no further yield increase * * *.

Appellant additionally provided the affidavits of Joseph Grady, a bacteriologist, and Harold Koepsell, a biochemist. The Grady affidavit states that the data presented in Table II of the Ciegler patent, reproduced supra, suggests to affiant that the optimum citrus molasses level falls somewhere below 5% and that affiant would be discouraged from investigating concentrations higher than 5%. Moreover, Grady averred that Fulde teaches nothing with respect to citrus *molasses* concentration and that the Ciegler patent, rather than Fulde, would be the guiding prior art disclosure for one of ordinary skill in the relevant art. The Koepsell affidavit states that Ciegler, Nelson and Hall are highly respected in the fermentation arts, that their indication that at levels of citrus molasses higher than 5% no further beta-carotene yield increase could be expected would dissuade those skilled in the art from experimenting with such higher levels, and that with respect to the alleged equivalency between citrus meal and citrus molasses taught, in the examiner's view, in Fulde, "citrus meal has never been equated with citrus molasses in terms of concentration and b-carotene yield."

Opinion

[1] We do not think that the use of citrus molasses at concentrations higher than 5% would have been obvious from the Ciegler patent. While not expressly contrary, the Ciegler patent tends to teach away from such concentrations in its disclosure of a lower yield of beta-carotene at 5% than at 2.5%. That trend is underscored when the citrus meal results are considered. There, the increase in concentration of the additive increases product yield as shown in the table reproduced supra. The Ciegler publication and the Grady and Koepsell affidavits provide additional evidence that the impression to be drawn from the Ciegler patent is that citrus molasses values greater than 5% would not be expected to be advantageous. Ciegler, Nelson and Hall flatly state this in their publication, and we regard the opinions of experts in the field as entitled to consideration. *In re Fay*, 52 CCPA 1483, 1489-90, 347 F.2d 597, 603, 146 USPQ 47, 51 (1965).

[2] The board was convinced that one of ordinary skill in the art would experiment to determine optimum levels of citrus molasses concentration, especially where a commercial process rather than a laboratory-scale operation would be sought. However, while it may ordinarily be the case that the determination of optimum values for the parameters of a prior art process would be at least *prima facie* obvious, that conclusion depends upon what the prior art discloses with respect to those parameters. Where, as here, the prior art disclosure suggests the outer limits of the range of suitable values, and that the optimum resides within that range, and where there are indications elsewhere that in fact the optimum should be sought within that range, the determination of optimum values

outside that range may not be obvious. We think it is not on the facts of this case.

The board also relied on the fact that in the Ciegler patent only two values, other than the control, are reported and concluded that one would not consider such a limited amount of testing to be adequate. Whatever may be said of the statistical significance of two points, the fact remains that this is all that the Ciegler patent reports, and if there is evidence tending to weaken the inference to be drawn from that data, we cannot find it in the record. The examiner supplied Hoffmann to establish the unpredictability of optimum values of process parameters in the fermentation arts, and the board apparently felt that, to some extent, the existence of anomaly would suggest further experimentation to determine optimum values. However, we think that logic and reason compel the conclusion that in an area of technology shown to be highly unpredictable in process values, the discovery of optimum values not in any way suggested by the prior art is more likely to be *unobvious* than obvious within the meaning of § 103. In establishing the unpredictability of the art relevant to the subject matter on appeal, the record strengthens appellant's claim that the realization that use of citrus molasses concentrations outside of anything taught or suggested by the Ciegler patent to increase beta-carotene yields is indeed unexpected.

The rejection of claims 1-3 under 35 U.S.C. 103 over the Ciegler patent in view of Hoffmann is accordingly *reversed*. We likewise reverse the rejection of those claims under § 103 over Fulde alone or in view of the Ciegler patent. As noted above, the examiner reasoned that Fulde renders obvious the use of citrus molasses at citrus meal concentrations which are disclosed to be higher than 7-1/2%. However, there is no suggestion in Fulde of using the molasses at the same concentration levels as the meal, and as is evident from the tables in the Ciegler patent, citrus meal and citrus molasses behave differently in terms of beta-carotene production. At most, Fulde teaches nothing with respect to suitable citrus molasses levels, and when we view the Fulde and Ciegler patents in conjunction with the Ciegler publication, we are convinced that the substitution of citrus molasses for citrus meal in the

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Fulde process at the citrus meal concentrations would not have been obvious to one of ordinary skill in the art.

Having weighed the strength of the evidence of obviousness against the evidence of nonobviousness provided by appellant, we conclude that none of the examiner's rejections are sustainable in this case and that the claimed subject matter on appeal would not have been obvious to one of ordinary skill in the art at the time the invention was made within the meaning of 35 U.S.C. 103. The decision of the board is therefore reversed.

- End of Case -

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227 USPQ 657

Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., et al. U.S. Court of Appeals Federal Circuit

No. 84-1779

Decided October 25, 1985

776 F2d 281

Headnotes

PATENTS

[1] Invention -- Specific cases -- Chemical (► 51.5093)

Federal district court committed reversible error in combining teachings of prior art to reach conclusion of obviousness of claimed subject matter and process, in substituting claimed resin, of which one of ordinary skill in art would not have knowledge, into prior art patent and concluding obviousness therefrom, in failing to consider evidence going to secondary considerations, and in failing to determine whether there was nexus between proffered evidence of secondary considerations and merits of claimed invention.

Particular Patents

Particular patents -- Foundry Binders

3,409,579, Robins, Foundry Binder Compositions Comprising Benzylic Ether Resin, Polysiocyanate, and Tertiary Amine, holding of invalidity of claims 14 and 19 *reversed*.

3,485,797, Robins, Phenolic Resins Containing Benzylic Ether Linkages and Unsubstituted Para Positions, holding of invalidity of claims 1, 2, 7, and 10, *reversed*.

3,676,392, Robins, Resin Compositions, holding of invalidity of claim 17, *reversed*.

Case History and Disposition

Appeal from District Court for the Eastern District of Michigan, Feikens, J.; 222 USPQ 688 .

Action by Ashland Oil, Inc., against Delta Resins & Refractories, Inc., et al., for patent infringement and misappropriation of trade secrets. From judgment for defendants, plaintiff appeals. Reversed.

Attorneys

Bruce Tittel, and Wood, Herron & Evans, both of Cincinnati, Ohio (William G. Konold, Cincinnati, Ohio, on the brief) for appellant.

Donald E. Egan, and Cook, Wetzel & Egan, Ltd., both of Chicago, Ill., for appellees.

Judge

Before Markey, Chief Judge, and Davis and Kashiwa, Circuit Judges.

Opinion Text

Opinion By:

Kashiwa, Circuit Judge.

Ashland Oil, Inc. (Ashland) appeals from the judgment of the United States District Court for the Eastern District of Michigan, Southern Division, holding claims 1, 2, 7 and 10 of U.S. Patent No. 3,485,797 (the '797 patent), claims 14 and 19 of U.S. Patent No. 3,409,579 (the '579 patent), and claim 17 of U.S. Patent No. 3,676,392 (the '392 patent) invalid under 35 U.S.C. §103. We reverse and remand.

Background

Ashland is the assignee of the three patents involved in this case, which were issued to Dr. Janis Robins. These patents are directed to certain chemical products and processes finding ultimate use in the foundry industry. One method of forming metal castings in the foundry industry involves compacting sand around a pattern to form a sand mold, removing the pattern, and then pouring molten metal into the sand mold. This process often involves the use of internal sand cores around which the molten metal flows to produce various internal configurations.

A chemical binder, for example a phenolic urethane formed by reacting a phenol-formaldehyde resin with a hardener component, such as a polyisocyanate, and a curing agent, such as a tertiary amine, is mixed with the sand, causing the sand-binder mixture to harden at a predetermined rate. After the sand mold mixture has hardened, the mixture retains its shape during the pouring of the molten metal. After the metal solidifies the binder must break down to permit the sand to be readily dislodged from the casting.

An optimized sand-binder mixture should have a slow or negligible curing period after the initial mixing of the binder with the sand, i.e., the work time, followed by a period of rapid curing. During the work time, the sand-binder mixture remains flowable, due to negligible curing or hardening, to allow easy forming of the mixture to conform to the pattern. Rapid curing after the mold has been formed allows the sand-binder mixture to rapidly reach its hardened state, thus permitting initiation of molten metal pouring.

Ashland sued Delta Resins & Refractories, Inc. (Delta)¹ for infringement of claims 1, 2, 7 and 10 of the '797 patent, claims 14 and 19 of

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the '579 patent and claim 17 of the '392 patent. Claims 1, 2, and 7 of the '797 patent are directed to a process for producing a phenol-formaldehyde resin which may be used in producing a chemical binder useful in the formation sand molds. Claim 10 of the '797 patent is directed to one of the resin products derived from this process.

¹ The voluminous record submitted by the parties did not include a complaint listing the defendants in this case. The Joint Final Pretrial Report, paragraphs 5-8, indicates that, in addition to Delta Resins & Refractories, Inc., the named defendants are the Aristo Corporation, David Horstman, Lawrence D. Kancius and Gary Lukacek.

Claim 1 of the '797 patent is a broad process claim² directed to reacting a phenol and aldehyde in the presence of a catalyst and reads as follows:

² Process claim 2 further limits the reaction temperature of the process from about 110 to 120°C. Process claim 7 limits the soluble divalent metal salt to salts of lead or zinc.

1. A process for the preparation of phenol aldehyde reaction products which comprises reacting a phenol having the general formula wherein X, Y, and Z are hydrogen, hydrocarbon radicals, oxyhydrocarbon radicals or halogen, with an aldehyde having the general formula R'CHO wherein

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA at 1-800-372-1033.

R' is hydrogen or a hydrocarbon radical of 1-8 carbon atoms at a mole ratio of aldehyde to phenol of greater than 1,

in the liquid phase under substantially anhydrous conditions with the removal of water above 100°C and

at temperatures below about 130°C in the presence of catalytic concentrations of a soluble divalent metal salt dissolved in the reaction medium.

Claim 10 of the '797 patent is directed to a phenol-formaldehyde resin (Pep resin)³ and reads as follows:

³ The district court characterized the '797 resin of claim 10 as such and we adopt this

terminology. Conventional phenolic resin chemistry describes two groups of phenolic resins: resoles and novolacs. Resoles are formed by reacting a phenol with excess formaldehyde in the presence of an alkaline catalyst while novolacs are formed by reacting an excess of phenol with formaldehyde in the presence of an acidic catalyst. R. MARTIN THE CHEMISTRY OF PHENOLIC RESINS, 88 (Fig. 2) (John Wiley & Sons, Inc. 1956). The use of the process of claim 1 to form the Pep resin requires that an excess of formaldehyde be reacted with phenol in the presence of a soluble divalent metal salt catalyst. The specification of the '797 patent teaches that the salt radical of the catalyst should be that of a stronger acid. Thus, the phenolic resin formed by the process of the '797 patent, as claimed in claim 10, fails to fall squarely into either group of phenolic resins described in the prior art, resoles or novolacs.

-
10. The phenol formaldehyde resin having the general formula wherein R is hydrogen, hydrocarbon radical, oxyhydrocarbon radical or halogen, meta to the hydroxyl group of the phenol; m and n are numbers the sum of which is at least two and the ratio of m-to-n is greater than one; and A is a hydrogen or a methylol group, the molar ratio of said methylol group to hydrogen being at least one. ⁴

⁴ The left hand phenol depicted *supra* has been labeled so that the ortho (2, 6), meta (3, 5) and para (4) positions are identifiable. CH₂-O-CH₂ identifies a benzylic ether bridge, CH₂ identifies a methylene bridge, OH is the chemical designation for a hydroxyl group, and CH₂OH is the chemical designation for a methylol group.

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA at 1-800-372-1033.

Claim 14 of the '579 patent ⁵ is a dependent claim ⁶ directed to a foundry mix which contains sand as the major constituent and up to 10% by weight, based upon the weight of the sand, of a binder composition. The binder composition comprises in admixture the Pep resin as described in claim 10 of the '797 patent, a hardener component comprising a liquid polyisocyanate containing at least two isocyanate groups and a curing agent comprising a tertiary amine.

⁵ In prior litigation between Ashland and Delta, claims 1, 13, 15, 16 and 18 of the '579 patent were invalidated for obviousness. See *Ashland Oil, Inc. v. Delta Oil Products*, 212 USPQ 508 (E.D. Wis. 1981), *rev'd in part*, 685 F.2d 175, 216 USPQ 857 (7th Cir. 1982), *cert. denied*, 103 S.Ct. 1769 (1983). None of these prior invalidated claims involved the Pep resin of claim 10 of the '797 patent.

⁶ Claim 14 incorporates the binder composition of claim 6, claim 6 in turn being dependent upon claim 1, the broad binder composition claim of the '579 patent.

Claim 19 of the '579 patent is a dependent claim ⁷ which reads as follows:

⁷ Claim 19 has been redrafted in the format of claim 15, with the addition of the relevant portion of claim 6, to facilitate review. Claim 19 is dependent upon claim 15, and incorporates the phenolic resin of claim 6, i.e., the Pep resin of claim 10 of the '797 patent.

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19. The process of preparing shaped foundry products which comprises:

(a) forming a foundry mix by uniformly distributing on a foundry aggregate containing sand as the major constituent a bind

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ing amount of up to 10% based on the weight of the aggregate of a binder composition obtained by combining [a phenolic resin having the general formula wherein R is hydrogen or a phenolic substituent meta to the hydroxyl group of the phenol, m and n are numbers the sum of which is at least 2, and the ratio of m-to-n is at least 1, and X is a hydrogen or a methylol group, the molar ratio of said methylol group-to-hydrogen being at least 1] and hardener component of claim 1, said polyisocyanate being employed in a concentration of 10 to 500% by weight of the phenolic resin;

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA at 1-800-372-1033.

in hard copy or call BNA at 1-800-372-1033.

- (b) shaping the foundry mix in a mold; and
- (c) contacting the shaped foundry mix with a tertiary amine until the binder is cured.
(bracketed material added, see *supra* note 7).

Claim 17 of the '392 patent⁸ is a dependent claim⁹ which reads as follows:

⁸ In the prior action between Ashland and Delta, see *supra* note 5, the district court had held all claims of the '392 patent invalid for obviousness. The Seventh Circuit reversed in part, holding that only claims placed in issue, in that case claims 1 and 16, were subject to invalidation. The invalidated claims were not directed to the use of the Pep resin.

⁹ Claim 17 incorporates the resin composition of claim 1, with the additional limitation of claim 7 wherein the phenolic resin component is a benzyllic ether resin. The relevant portion of claim 7 has been incorporated into claim 17 to facilitate review.

17. A foundry mix containing sand as the major constituent, and a binding amount of up to 10 percent based on the weight of sand of the resin composition [, said resin composition comprising in admixture,

a benzyllic ether resin which has the general formula wherein R is hydrogen or a phenolic substituent meta to the hydroxyl group of the phenol, m and n are numbers the sum of which is at least 2, X is an end-group from the group consisting of hydrogen and methylol, and wherein m is at least 1 and the sum of m and the number of methylol end-groups is at least two,

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA at 1-800-372-1033.

a hardener component comprising a liquid polyisocyanate containing at least two isocyanate groups and present in an amount equal to 10 to 500 weight percent based on the weight of the resin, and

a curing catalyst having a pK_b value in the range of about 7 to 11 and present in an amount equal to 0.01 to 10.0 weight percent based on the weight of the resin].

(bracketed material added, see *supra* note 9).

District Court Proceedings

The district court noted that although the ultimate question of patent validity is a legal one, the determination of obviousness lends itself to several basic factual inquiries, to wit, the scope and content of the prior art, differences between the prior art and the claims at issue, and the level of ordinary skill in the pertinent art. The court recognized that Delta, as the party asserting patent invalidity, has the burden of proving that the claimed inventions in issue would have been obvious by clear and convincing evidence. Once Delta has established a *prima facie* case of obviousness, the burden of going forward shifts to Ashland to rebut with evidence of nonobviousness, although the burden of persuasion remains with Delta.

The court found that a person of ordinary skill in the art would have a bachelor's degree in chemistry, several years experience in phenolic and urethane chemistry, and several months exposure to the foundry art.

a. '797 Resin Claim:

The court stated that Delta relied primarily upon three prior art references to support its argument that the invention set forth in claim 10 would have been obvious: (1) U.S. Patent No. 2,079,633 (the Rothrock patent); (2) N. MEGSON, PHENOLIC RESIN CHEMISTRY (Academic Press Inc. 1958); and (3) R. MARTIN, THE CHEMISTRY OF PHENOLIC RESINS (John Wiley & Sons, Inc. 1956).

Claim 10 of the '797 patent, the court stated, requires that the sum of m and n must be at least two such that Ashland's Pep resin must have at least three rings and may have up to forty. The Pep resin contains some three ring and greater molecules, along with a substantial amount of one and two ring adducts. The court

found ¹⁰ that the process disclosed in the Rothrock patent produces claim 10 material, although having a large portion of adducts and only a small amount of three ring or greater molecules. Ashland denied that the Rothrock process produces the Pep resin of claim 10, and averred that the Rothrock resin is inferior to the Pep resin as a foundry binder because Rothrock's hydroxyl groups are modified by butyl alcohol solvents.

¹⁰ Ashland has argued that the district court made few factual findings, that the court was merely presenting the arguments of the parties. While the format of the court's opinion lends some credence to this argument, we note that the court properly recognized that it was required to make factual determinations on the scope and content of the prior art and the differences between the prior art and the Robins patents. See *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). Thus, the court's exposition appears to be the court's shorthand method of examining the prior art and the differences between the prior art and the patents in issue. Consequently, we review these statements by the court as its factual findings.

As to the MEGSON reference, diagram A, see Appendix, illustrates a polybenzyllic ether resin within the scope of claim 10. The drawing shows phenol-formaldehyde resin molecules having an ortho-ortho orientation, connected by ether bridges, and an open para position. Claim 10 requires the sum of methylene and ether bridges to be at least two, and while the molecule of the diagram does not show methylene bridges, it is still within the scope of claim 10 because it satisfies the requirement that the sum of methylene and ether bridges with its two ether bridges. Ashland's position is that MEGSON does not disclose instructions for the preparation of this polybenzyllic ether resin, and further that the molecule depicted in diagram A is only a hypothetical structure postulated to be present during curing, not what is present in a room temperature reaction product.

MARTIC discloses a linear polymeric ether resin containing up to thirty-five phenol rings linked together by ether bridges in an ortho-ortho orientation. Jordan Kopac, Delta's president, ¹¹ testified that MARTIN teaches how ether linkages are formed, and how the number of ether linkages may be increased. Further, as temperature increases, some ether linkages will break down, producing methylene linkages and formaldehyde, the formaldehyde being available to cross-link the resin. The position of Ashland was that the open para position of the Pep resin allows phenol reaction at this site, an important consideration in producing a superior binder, but MARTIN teaches a structure which is para substituted.

¹¹ During pretrial discovery Delta had identified Dr. Raymond Wentland as its only expert witness. Dr. Wentland was not called to testify during trial. Instead, Delta chose to rely primarily on the testimony of Mr. Kopac, who although possessing the qualifications of one of ordinary skill in the art, had not been qualified to testify as an expert witness.

Based upon this prior art, the court found that while no single prior art reference rendered the Pep resin of claim 10 obvious, the references taken together would have suggested that resin. See *Leinoff v. Louis Milona & Sons, Inc.*, 726 F.2d 734, 739, 220 USPQ 845, 848-49 (Fed.Cir. 1984). Therefore, Delta had sustained its burden of proving by clear and convincing evidence that the Pep resin of claim 10 would have been obvious to one of ordinary skill in the art.

The Rothrock patent, MEGSON, and MARTIN collectively suggest the critical elements of the claimed material, i.e., a phenol-formaldehyde resin containing linear polymers which consist of phenol rings connected by ether bridges or ether and methylene bridges in an ortho-ortho orientation having an unsubstituted para position.

The court held that Ashland's evidence was insufficient to rebut Delta's clear and convincing evidence that claim 10 would have been obvious to one skilled in the art in light of the prior art, and that Ashland failed to establish that one of ordinary skill in the art would have been unable to read the prior art references and "discover" the resin claimed by Robins.

b. '797 Process Claims:

The court stated that Delta had sustained its burden of proving by clear and convincing evidence that the prior art discloses reacting phenol with formaldehyde under essentially the same conditions as the Robins patent, finding that the prior art cited by Delta would have suggested to one of ordinary skill in the mid 1960s the possibility of developing the process claimed in claims 1, 2 and 7 of the '797 patent. The Rothrock patent describes a process for manufacturing phenolformaldehyde resins,

teaching a process using: (1) a formaldehyde/phenol ratio greater than 1; (2) paraformaldehyde (the anhydrous form of formaldehyde), and removal of water in some cases; a temperature range of 100-120°C; and (4) soluble metal salt catalysts, including zinc acetate.

Japanese Patent 13696/60 describes a process for producing phenol-formaldehyde initial condensates, by reacting phenol and formaldehyde: (1) under anhydrous polymerization conditions (starting with paraformaldehyde and removing water); (2) at temperatures

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above 100°C and as high as 120°C; and (3) using soluble metal salts as catalysts. Although the examples of the Japanese Patent teach of formaldehyde/phenol ratio less than 1, the specification teaches that a formaldehyde/phenol ratio greater than 1 may be used.

The prior art reference of Fraser, Hall & Raum, *Preparation of 'High-Ortho' Novolak Resins*, J. App. Chem. (Dec. 1957), teaches the effectiveness of zinc and lead as catalysts to form ortho-ortho linked phenol-formaldehyde chains, and that benzylic ether bridges are formed at reaction temperatures below 140°C.

There are differences between this prior art and the '797 process claims. The Rothrock patent does not teach removal of water above 100°C and the Fraser reference does not teach the removal of water at all. Both Rothrock and the Japanese Patent use butyl alcohol as a solvent, whereas Robins discloses the use of toluene. The '797 claims in issue, however, do not mention the use of solvents. The butyl alcohol *modified* resin of Rothrock is not a phenolic resin. Ashland has also argued that neither the Japanese Patent nor Fraser produce compounds with more than two rings.

But, the court stated that Ashland had failed to establish that these differences, in light of Delta's proof, are great enough to render the inventions in issue non-obvious. The cited references collectively, if not individually, teach: (1) a formaldehyde/phenol ratio greater than 1; (2) anhydrous conditions; (3) a reaction temperature range of 100-120°C; and (4) soluble metal salt catalysts. The differences between the prior art and the claims in issue are insignificant because one of ordinary skill in the art could study the prior art references and come upon the '797 process claims.

For example, one of ordinary skill could read Rothrock and recognize that varying the solvent in Example 5 and removing water -- as Rothrock did in Examples 1 and 7 - yields a process, which could be substantially similar to the '797 process, for preparing certain phenol-formaldehyde reaction products. Similarly, although the Japanese Patent and the Fraser reference do not produce compounds with greater than two rings, one of ordinary skill reading these pieces of prior art could apply his knowledge and develop a process for preparing a phenolic resin which could be substantially similar to the process of the '797 patent.

c. The '579 and '392 Foundry Binder Claims:

The '579 and '392 foundry binder systems consist of the Pep resin, a polyisocyanate hardener, and a tertiary amine catalyst for the '579 claims or a catalyst with a pK_b value of about 7 to about 11 for the '392 claim.

Delta argued that the prior art, i.e., U.S. Patents Nos. 3,409,571 ('571 patent) and 3,398,122 ('122 patent) issued to Shepart and British Patent 1,031,909, disclosed the use of phenolic urethanes as foundry binders. Dr. Frisch, an expert witness, testified that Robins' foundry binder claims would not have been obvious to one skilled in the art. One skilled in the art would not expect polyurethanes to work as foundry binders since it was known in the field that reacting phenol with isocyanates results in a blocked phenol forming an unstable urethane which disassociates or reverts to phenol and isocyanates upon heating at temperatures of 140-150°C.

The court's examination of the prior art led it to conclude otherwise. While recognizing that the British Patent ¹² was technically not prior art, it was indicative of what was known to persons of ordinary skill in the art. The patent described reacting novolac resins with highly reactive divalent materials to form a soluble product which can then be thermoset to produce a foundry binder, and such a claim is made in claim 12. The court concluded that the British Patent discloses the use of phenolic urethanes as foundry binders.

¹² The application on the British patent was filed in London on 5 November 1963 and published on 2 June 1966. This application was based upon a prior United States application, Serial No. 241,131, filed 30 November 1962. The application on the '797 patent was filed on 14 March 1962, the application on the '392 patent had a continuation-

in-part filing date of 14 March 1962 and the application on the '579 patent had a continuation-in-part filing date of 1 August 1966.

The court found the Shepard patents significant in that Shepard described a novolac phenolic resin modified with a phosphorous compound, i.e., a soluble thermoplastic. Shepard's '571 patent clearly states that thermosetting products can be produced by mixing thermoplastic products with polyisocyanates, and that such thermosetting products are useful as foundry sand binders. Based upon the foregoing, the court concluded that the use of phenolic urethanes as foundry binders was taught by the prior art.

While Ashland argued that Shepard teaches the use of a novolac resin while the '579 and '392 claims here in issue use the Pep resin, the court found this difference insufficient to warrant a finding of nonobviousness. One skilled in the art could readily sense that the Pep resin might be substituted into the Shepard patent. It was known in the prior art how ether

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bridges and OH groups react with polyisocyanates. One skilled in the art could look at MEGSON, MARTIN and the Rothrock patent, analyze their teachings in light of Shepard and the British Patent, and conclude that a polybenzylid ether resin could be plugged into Shepard to produce a phenolic urethane foundry binder.

The court found that Delta had sustained its burden of proving that one of ordinary skill in the art of phenolic chemistry would have found it obvious to use tertiary amines to promote the reaction between the Pep resin and polyisocyanates. J. SAUNDERS & K. ERISCH, POLYURETHANES: CHEMISTRY AND TECHNOLOGY (Interscience Pub. 1962, reprint 1978), teaches that at low temperatures "one normally uses a catalyst such as a tertiary amine or aluminum chloride to promote this reaction." Further, Shepard's '571 and '122 patents, and U.S. Patent Nos. 3,242,107, 3,282,896, and 3,043,794 disclose that tertiary amines in lieu of or in addition to heat promote the reaction between phenolic resins and polyisocyanates.

The court also found that Delta had sustained its burden of proof to show that the use of a curing agent with a pK_b value of about 7 to about 11 to promote the reaction between the Pep resin and polyisocyanates would have been obvious to one of ordinary skill. The SAUNDERS reference disclosed work carried out in the 1940s involving catalysts with the pK_b range as claimed in claim 17 of the '392 patent which showed that base strength is a controlling factor of a catalyst's effectiveness in urethane formation. Moreover, the Shepard patents and U.S. Patent Nos. 3,156,659 3,063,964, and 2,906,717 disclosed the use of various catalysts with a pK_b value in the range of claim 17 to promote the reaction between phenolic resins and polyisocyanates.

d. Secondary Considerations:

The court, citing to *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed.Cir. 1983), cert. denied 105 S.Ct. 172 (1984), and *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 218 USPQ 871 (Fed.Cir. 1983), stated that it had considered relevant secondary considerations before reaching the conclusion that the Robins' patents would have been obvious. The court noted that there were no independent secondary considerations relevant to the '797 patent apart from its use in Isocure, the commercial foundry mix patented under the '579 patent, and Pep Set, the commercial foundry mix patented under the '392 patent.

The court found the commercial success of Isocure and Pep Set impressive, noting that Ashland had sold millions of pounds annually of these products, and that both products enjoyed an increasing market share. While noting that Ashland had granted licenses under these patent to Combustion Engineering Company and International Minerals and Chemical Company, the court further found that after Ashland lost the Milwaukee litigation Combustion Engineering sought a declaratory judgment that the patent claims here in suit were invalid, and subsequently settled for a renegotiated royalty rate decrease from 12.5% to 5%. International Minerals was found to have gone out of the business approximately one year after it was granted a license.

The court noted that Ashland had offered proof that Isocure and Pep Set had received recognition from the foundry industry in the form of awards and write-ups in trade publications. The court, however, found this recognition directed more towards the marketing of, rather than the invention of, these products. The court found it significant that Dr. Robins had not received any recognition from the industry and only \$200 from Ashland for his role in developing Isocure and Pep Set.

The court stated that the law is well established that commercial success alone, or combined with

other secondary evidence, is insufficient to establish patentability where primary indicia of patentability is lacking. After weighing Isocure and Pep Set's secondary considerations including commercial success against the primary indicia of obviousness -- disclosures in the prior art -- the court concluded that all the patent claims in suit were invalid for obviousness.

OPINION

A determination of whether the subject matter of claims in issue would have been obvious under 35 U.S.C. §103 involves factual findings with respect to: (1) the scope and content of the prior art; (2) the level of ordinary skill in the art; (3) the differences between the claimed subject matter and the prior art; and (4) where relevant, objective evidence of nonobviousness, e.g., long-felt need, commercial success, failure of others, copying, unexpected results, i.e., the secondary considerations. *Perkin-Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 894, 221 USPQ 669, 674 (Fed.Cir. 1984); *Jones v. Hardy*, 727 F.2d 1524, 1527, 220 USPQ 1021, 1023 (Fed.Cir. 1984); *W.L. Gore & Associates, Inc. v. Garlock Inc.*, 721 F.2d 1540, 1550, 220 USPQ 303, 311 (Fed.Cir. 1983), cert. denied, 105 S.Ct. 172 (1984). These factual findings serve as the foundation upon which the court bases its ultimate conclusion regarding the obviousness of the claimed sub

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ject matter as a whole. *Lear Siegler, Inc. v. Aeroquip Corp.*, 733 F.2d 881, 890, 221 USPQ 1025, 1033 (Fed.Cir. 1984). This court reviews the ultimate conclusion of obviousness as one of law on which it must exercise independent judgment. *Union Carbide Corp. v. American Can Co.*, 724 F.2d 1567, 1573, 220 USPQ 584, 589 (Fed.Cir. 1984).

A patent is presumed valid, and the burden of establishing invalidity as to any claim of a patent rests upon the party asserting such invalidity. 35 U.S.C. §282 (1982). The presumption of validity is a procedural device that mandates that the party asserting invalidity bears the initial burden of establishing a *prima facie* case of obviousness under 35 U.S.C. §103. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1534, 218 USPQ 871, 875 (Fed.Cir. 1983). Once a *prima facie* case has been established, the burden shifts to the patentee to go forward with rebuttal evidence showing facts supporting nonobviousness. *Ralston Purina Co. v. Far-Mar-Co, Inc.*, 227 USPQ 177, 178, No. 84-1237, slip op. at 5 (Fed.Cir. September 5, 1985); accord, *In re Piaseki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed.Cir. 1984). The party asserting invalidity, however, always retains the burden of persuasion of the issue of obviousness until a final judgment is rendered. *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1359, 219 USPQ 473, 478 (Fed.Cir. 1983); *Stratoflex*, 713 F.2d at 1534, 218 USPQ at 875. Each fact forming the factual foundation upon which the court bases its ultimate conclusion regarding the obviousness of the claimed subject matter as a whole must be established by clear and convincing evidence. *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1459, 221 USPQ 481, 486 (Fed.Cir. 1984); *SSIH Equipment Co. S.A. v. United States International Trade Commission*, 718 F.2d 365, 375, 218 USPQ 678, 687 (Fed.Cir. 1983).

On appeal, however, the party subject to the adverse judgment on the issue of validity, in this case the patentee Ashland Oil, bears the burden of showing either that the district court committed reversible legal error in its ultimate conclusion as to obviousness, or that the district court's probative factual findings underlying its ultimate conclusion on obviousness were clearly erroneous. ¹³ *Fromson v. Advance Offset Plate, Inc.*, 755 F.2d 1549, 1555, 225 USPQ 26, 30 (Fed.Cir. 1985).

¹³ A finding is clearly erroneous when the appellate court, after reviewing the entire record, is left with the definite and firm conviction that a mistake has been made, even though there is some evidence in the record to support such a finding. *United States v. U.S. Gypsum Co.*, 333 U.S. 364, 395, 76 USPQ 430, 444 (1948); *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458, 221 USPQ 481, 485 (Fed.Cir. 1984).

Further guidance as to the role of appellate review under the clearly erroneous standard has been provided by the Supreme Court in *Anderson v. City of Bessemer City, N.C.*, 105 S.Ct. 1504, 1511, 1512 (1985), wherein the Court stated that:

This standard plainly does not entitle a reviewing court to reverse the finding of the trier of fact simply because it is convinced that it would have decided the case differently.

* * * * *

If the district court's account of the evidence is plausible in light of the record reviewed in its entirety, the court of appeals may not reverse it

even though convinced that had it been sitting as the trier of fact, it would have weighed the evidence differently. Where there are two permissible views of the evidence, the factfinder's choice between them cannot be clearly erroneous.

A. CLAIM 10 OF THE '797 PATENT -- PEP RESIN

The district court found that the Pep resin of claim 10 contained some three ring and greater molecules, along with a substantial amount of one and two ring adducts, that the process taught by the Rothrock patent produces claim 10 material, although having a large portion of adducts and only a small amount of three ring or greater molecules, that MEGSON taught phenol-formaldehyde resins having an ortho-ortho orientation, connected by ether bridges and having an open para position, and that MARTIN taught a linear polymeric ether resin having up to thirty-five phenol rings linked by ether bridges, some of these ether linkages breaking down at higher temperatures to produce methylene linkages and formaldehyde. Based upon these findings, the court concluded that the Pep resin of claim 10 of the '797 patent would have been obvious to one of ordinary skill in the art inasmuch as the Rothrock patent, MEGSON, and Martin collectively suggested the critical elements of Pep resin here at issue.

Before reviewing the factual findings made by the district court with respect to the teachings of each of the individual references, and the propriety of combining the teachings of these references, we find it appropriate to address several statements made by the district court. See *Union Carbide Corp.*, 724 F.2d at 1574, 220 USPQ at 590 (while faulty reasoning may lead to a wrong result, appellant must show not only error in reasoning but error in result).

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A.1 Combining References

First, the court stated that Ashland had failed to establish that one of ordinary skill in the art would have been unable to read the prior art references and "discover" the Pep resin claimed by Robins. The law does not impose a burden on Ashland to establish that the *combined* teachings of the individual prior art references would not have led one skilled in the art to discover the Pep resin of claim 10. The ultimate burden of establishing invalidity rests upon the party espousing such. *Stratoflex*, 713 F.2d at 1534, 218 USPQ at 875. Where the party asserting invalidity must rely upon a combination of prior art references to establish invalidity, that party bears the burden of showing some teaching or suggestion in these references which supported their use in combination. *W.L. Gore*, 721 F.2d at 1552, 220 USPQ at 312. It is legal error to place this burden on the patentee.

A.2 35 U.S.C. §282

Further, if this statement is interpreted to place upon the patentee the burden of establishing the validity of his patents, it is at odds with established case law. Section 282 of Title 35 places the burden for the initial production of evidence, *Stratoflex*, 713 F.2d at 1534, 218 USPQ at 875, and the ultimate burden of persuasion on the issue of validity on the party asserting patent invalidity. *Hughes Aircraft*, 717 F.2d at 1359, 219 USPQ at 478; *Stratoflex*, 713 F.2d at 1534, 218 USPQ at 875. While the burden for the production of evidence shifts to the patentee once a *prima facie* case of invalidity is established, *Ralston Purina*, 227 USPQ at 178, slip op. at 5; *Piaseki*, 745 F.2d at 1472, 223 USPQ at 788, the ultimate burden remains with the party asserting invalidity, in this instance Delta, to establish that the claims of the patents here at issue are invalid. There is no burden on Ashland to establish that the claims of these patents are valid, and it is impermissible for a trial court to shift this burden to the patentee. *Jones*, 727 F.2d at 1528-29, 220 USPQ at 1025.

A.3 Evidence vis-a-vis Obviousness

The court also held that Ashland's evidence was insufficient to rebut Delta's clear and convincing evidence on the obviousness of claim 10 of the '797 patent. While on this record we cannot say that this holding by the district court was erroneous, it is open to an interpretation¹⁴ at odds with the established case law, and for this reason we set forth a brief explication of the relevant legal principles. All facts relevant to the issue of obviousness, both the facts established by the party asserting invalidity and the facts established by the rebuttal evidence submitted by the patentee, must be fully considered by the court *prior* to reaching its conclusion on obviousness. *W.L. Gore*, 721 F.2d at 1555, 220 USPQ at 314; *Stratoflex*, 713 F.2d at 1539, 218 USPQ at 879. These facts must be established by clear and convincing evidence. *Lindemann Maschinenfabrik*, 730 F.2d at 1459, 221 USPQ at 486; *SSIH Equipment*, 718 F.2d at 375, 218 USPQ at 687.

¹⁴ One possible interpretation of the district court's holding is that the district court evaluated the facts established by Ashland's rebuttal evidence solely on the basis of its ability to overcome or knockdown the legal inference of obviousness, i.e., Delta's facts establishing a *prima facie* case for obviousness. This approach was rejected in *In re Rinehart*, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976), wherein the court stated that facts established by rebuttal evidence must be evaluated along with the facts on which the earlier conclusion of obviousness, i.e., the *prima facie* case, was reached, not against the conclusion, itself. See *Ralston Purina Co. v. Far-Mar-Co, Inc.*, 227 USPQ 177, No. 84-1237, slip op. at 5 (Fed.Cir. September 5, 1985). The ultimate conclusion on obviousness must rest upon an evaluation of *all* facts that have been established by clear and convincing evidence.

A.4 The Pep Resin

The claims of a patent measure and define the invention. *Jones*, 727 F.2d at 1024, 220 USPQ at 1024. A §103 determination requires an evaluation of the prior art references with respect to the claimed invention. *Lear Siegler*, 733 F.2d at 890, 221 USPQ at 1033; *Union Carbide*, 724 F.2d at 1574-75, 220 USPQ at 590-91. The claims here in issue are to be read and construed ¹⁵ in light of the specification and prosecution history of the patent. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 USPQ 929, 932 (Fed.Cir. 1984). The district court found that the Pep resin of claim 10 contained some three ring and greater molecules, along with a substantial amount of one and two ring adducts. This finding is clearly erroneous, being based upon a misconstruction of the governing law and an interpretation of claim 10 which is erroneous as a matter of law. Cf. *Lemelson v.*

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United States, 752 F.2d 1538, 1552, 224 USPQ 526, 534 (Fed.Cir. 1985).

¹⁵ Claim interpretation is a legal matter subject to review free of the clearly erroneous standard applicable to fact findings. *Raytheon Co. v. Roper Corp.*, 724 F.2d 951, 956, 220 USPQ 592, 596 (Fed.Cir. 1983), cert. denied, 105 S.Ct. 127 (1984).

The novel phenol-aldehyde resin as *claimed* in claim 10 is a linear phenolic resin wherein the sum of m and n must be at least two such that the phenolic resin as claimed comprises only molecules having three or more linked-phenol rings. Claim 10 does not claim one or two ring adducts, i.e., dimethylol phenols, benzylic ethers or methylene-bridged diphenols. ¹⁶ Relevant prior art for this §103 determination requires references which disclose phenolic polymers having three or more phenol rings, phenol rings linked by benzylic ether and methylene bridges, and phenol chains having at least one terminal methylol group.

¹⁶ The specification of the '797 patent teaches the formation of novel phenolic compositions characterized as a phenol-formaldehyde adduct or *modified* resole resin, which comprises one-ring dimethylol phenols and two-ring benzylic ethers and methylene-bridged phenols. The specification, however, also discloses that the novel phenolic resin of claim 10 is a higher molecular weight product formed by the condensation of the phenol-formaldehyde adduct. Further, the specification teaches that the "formulation of the [phenol-formaldehyde] Adduct . . . is a precursor to the novel phenolic resins [as claimed in claim 10]."

While the specification is silent as to the actual chemical composition of phenol aldehyde reaction products produced by practicing the process disclosed in the '797 patent, Dr. Robins, the inventor, testified that the phenol aldehyde reaction product resulting from this process would comprise approximately 5-10% phenol formaldehyde resin as claimed in claim 10, with the remainder being monomers such as dimethylol phenols, benzylic ethers and methylene-bridged phenols.

The actual chemical composition of the reaction products produced by the '797 process, however, is irrelevant to a §103 determination with respect to the *product* claimed in claim 10. The metes and bounds of claim 10 define the relevant product for the §103 determination. *Lear Siegler*, 733 F.2d at 890, 221 USPQ at 1033.

A.5 Opinion Testimony

While objective factual evidence going towards a §103 determination is preferable to statements of opinion on the issue, the nature of the matter sought to be established, as well as the strength of the opposing evidence, must be taken into consideration in assessing the probative value of expert

opinion. *In re Oelrich*, 579 F.2d 86, 91, 198 USPQ 210, 215 (CCPA 1978). Opinion testimony rendered by experts must be given consideration, and while not controlling, generally is entitled to some weight. See FEDR. EVID, 701-704; *Orthopedic Equipment Co. v. United States*, 702 F.2d 1005, 1012, 217 USPQ 193, 199 (Fed.Cir. 1983). Lack of factual support for expert opinion going to factual determinations, however, may render the testimony of little probative value in a validity determination. Cf. *In re Altenpohl*, 500 F.2d 1151, 1158, 183 USPQ 38, 44 (CCPA 1974). While the opinion testimony of a party having a direct interest in the pending litigation is less persuasive than opinion testimony by a disinterested party, it cannot be disregarded for that reason alone and may be relied upon when sufficiently convincing. Cf. *In re McKenna*, 203 F.2d 717, 720, 97 USPQ 348, 350-51 (CCPA 1953).

The district court found that the process disclosed in the Rothrock patent produced claim 10 material having a large portion of adducts, with only a small amount of three phenol ring or greater molecules. The bases for this finding were the objective teachings disclosed in the Rothrock patent, the opinion testimony given by Jordan Kopac, Delta's CEO, who although not qualified as an expert was within the category of one skilled in the art as found by the district court, see *supra* note 11, and the opinion testimony of Dr. Robert Conley, Ashland's expert witness. The court did not make any explicit credibility determinations with respect to the opinion testimony of Mr. Kopac and Dr. Conley, nor did the court give any indication as to the weight accorded this testimony.

A.6 The Rothrock Patent

The Rothrock patent disclosed a process for forming a heathardening unmodified phenolformaldehyde resin.¹⁷ There was no disclosure or teaching as to the chemical structure of this phenol-formaldehyde resin, i.e., what product was formed through the use of this process. *W.L. Gore*, 721 F.2d at 1550, 220 USPQ at 311. The district court did not point to any supporting statements or teachings in the Rothrock patent as a basis for its finding that the process of Rothrock produced a claim 10 phenolic resin.

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¹⁷ The Rothrock patent taught only that the phenolformaldehyde resin produced by the process disclosed therein was cured or heat-hardened by the addition of thermal energy to the resin. There was no disclosure that the resin was curable at room temperatures by the addition of an acid catalyst. The specification of the '797 patent, in contrast, teaches that the Pep resin is curable at room temperatures by the addition of an acid catalyst, or may be cured by the addition of thermal energy to the resin. *W.L. Gore*, 721 F.2d at 1550, 220 USPQ at 311 (a reference must have been considered in its entirety, for disclosures which taught away from the invention as well as disclosures which directed one skilled in the art towards the claimed subject matter).

Each element of a claim is material. *Lemelson*, 752 F.2d at 1551, 224 USPQ at 533. The process for producing the phenolic resin as claimed in claim 10 of the '797 patent requires the removal of water above 100 °C during the process.¹⁸ This removal of water occurs during the condensation stage of the '797 process wherein the previously formed phenol-formaldehyde adduct is condensed to form the claim 10 product. The specification of the '797 patent teaches the importance of removing water during the condensation step.¹⁹ There was no teaching in the Rothrock patent that water was to be removed *during* the disclosed process.²⁰

¹⁸ See *supra* note 16 and accompanying text.

¹⁹ The presence of water results in reaction products which cannot be cured to mechanically strong resins by the use of acidic reagents at room temperature. The presence of water affects not only the activity of the catalyst, but also the structure of the product formed, for example, permitting substitution at the para position.

²⁰ This statement will be more fully addressed in Section "B. THE PROCESS CLAIMS OF THE '797 PATENT", *infra*.

There is no presumptive correlation that two similar processes form substantially the same product where the processes differ by a materially limiting step. Cf. *In re Hoeksema*, 399 F.2d 269, 274, 158 USPQ 596, 601 (CCPA 1968) (if the prior art of record failed to disclose a method for making a claimed compound, at the time the invention was made, it cannot be legally concluded that the

compound itself was in the possession of the public).

There was no objective evidence to be gleaned from the Rothrock patent which would have supported a factual finding that the Rothrock patent produced claim 10 material. Concomitantly, there was no factual support for Mr. Kopac's opinion testimony with respect to the Rothrock patent, and consequently, Mr. Kopac's opinion testimony is of little probative value in a validity determination. *Altenpohl*, 500 F.2d at 1158, 183 USPQ at 44. Accordingly, the district court committed clear error when it found that the Rothrock process produced claim 10 material.²¹

²¹ The district court's factual finding that the process of the Rothrock patent produced claim 10 material is not plausible in light of the entire record. *Anderson v. City of Bessemer City, N.C.*, 105 S.Ct. 1504, 1512 (1985). There is no objective evidence disclosed in the Rothrock patent as to the nature of the product formed by the process disclosed therein. Delta did not proffer any objective evidence as to the type of phenolic resin produced by the Rothrock process. Mr. Kopac's opinion testimony as to what the Rothrock produced is not substantiated by any objective evidence, and therefore can have probative value only as conjecture of one skilled in the art. See FED.R. EVID. 701. The evidence of record does not support the view of that the Rothrock process produced claim 10 material. *Id.*

A.7 The MARTIN Reference

MARTIN, the court found, disclosed a linear polymeric ether resin containing up to thirty-five phenol rings linked in an ortho-ortho orientation by other bridges. A reference, however, must have been considered for all it taught, disclosures that diverged and taught away from the invention at hand as well as disclosures that pointed towards and taught the invention at hand. *W.L. Gore*, 721 F.2d at 1550, 220 USPQ at 311. While MARTIN taught a polymer having the phenol rings linked together by benzylic ether bridges, as well as at least one terminal methylol group, MARTIN also taught that this polymer had an "R" substituent at the para position. MARTIN taught that this R group was a substituent other than hydrogen. The polymeric resin of claim 10, in contrast, has an open or unsubstituted para position. Not only was the para position of the MARTIN compound blocked, there was no recognition that it would have been advantageous to replace the R substituent with a hydrogen, i.e., unsubstituted para position, to increase the polymer's reactivity.

A.8 The MEGSON Reference

The court found that the MEGSON reference illustrated a polybenzylic ether within the scope of claim 10, the drawing showing a phenol-formaldehyde resin molecule having ether bridge linkages at the ortho-ortho position and an open para position. The court found this molecule satisfied the m, n limitations of claim 10 by having at least two benzylic ether linking bridges, i.e., m equal to or greater than two while n equals zero.²² But,

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the MEGSON reference should also have been considered for disclosures that taught away from the invention here at issue. *Id.*, 220 USPQ at 311. The specific disclosure relied upon by the district court depicted two polymers cross-linked by a methylene derivative. Since this particular cross-linking mechanism was postulated to involve a reaction with nuclear hydrogen, the phenols of the polymers were shown as para unsubstituted, i.e., having hydrogen at the para position. The other cross-linking mechanisms, as well as a disclosure of a benzylic ether linked polymer product, depicted polymers having an "R" group at the para position. This R could have stood for hydrogen, or it could have stood for an organic radical.²³ There was no teaching in the explication of the cross-linking mechanism as to what the terminal end groups of these cross-linking structures were, i.e., there was no teaching that these cross-linking structures had a methylol terminal end group. Finally, there was uncontested testimony by Ashland's expert, see *supra* note 23, that the disclosure in the MEGSON reference relied upon by the district court was a hypothetical structure.

²² While we have reservations about this interpretation of claim 10, we will not, on the record before us, say it is erroneous as a matter of law. *ACS Hospital Systems*, 732 F.2d at 1577, 221 USPQ at 932. Under the court's interpretation when n is equal to zero, i.e., no methylene bridges, the ratio of m to n is undefined. But, whenever methylene bridges are present, i.e., n is a real number unequal to zero, the ratio of m to n is a finite real number. It is questionable whether the ratio of m to n would be a finite real number in all circumstances except one, where it is undefined.

The specification of the '797 patent indicates that the majority of linkages between the phenol rings will be benzylic ether such that the remainder of the linkages will be

methylene. The specification also teaches that, at the temperatures at which condensation occurs to form the claim 10 material, some methylene linkages are formed.

Dr. Robins, however, gave testimony that n could equal zero, but this testimony was elicited in connection with a discussion as to whether the dimethylol phenols, benzylic ethers and methylene-bridged phenols are within the scope of claim 10. Dr. Robins also testified that the scope of claim 10 did not encompass the one or two phenol-ring adducts, but only polymers having three or more phenol rings. Dr. Conley, Ashland's expert, also testified that n could be equal to zero. *Anderson v. City of Bessemer City, N.C.*, 105 S.Ct. 1504, 1512 (1985) (where there are two permissible views of the evidence, the fact finder's choice between them cannot be clearly erroneous). The court's interpretation of this claim appears to have been predicated on the factual testimony proffered by Ashland's witnesses.

²³ Dr. Conley testified that Megson's original work on this subject taught that the R group was an alkyl or aryl constituent. He also testified that the drawing cited by the district court, as well as the other two drawings relating to the cross-linking mechanism, were postulated or hypothetical structures to explain the cross-linking mechanism.

The test of whether a particular compound described in the prior art may have been relied upon to show that the claimed subject matter at issue would have been obvious is whether the prior art provided an enabling disclosure with respect to the disclosed prior art compound. Cf. *In re Donohue*, 766 F.2d 531, 533, 226 USPQ 615, 621 (Fed.Cir. 1985); *Hoeksema*, 359 F.2d at 273-74, 158 USPQ at 598-99. Delta did not offer evidence that showed an enabling disclosure for the disclosed structure of MEGSON, while uncontested testimony showed the MEGSON structure to be a hypothetical structure.

A.9 Conclusion

The district court concluded, in light of the Rothrock patent, MEGSON, and MARTIN, that the Pep resin as claimed in claim 10 of the '797 patent would have been obvious. Obviousness, however, cannot be established by combining the teachings of the prior art to produce the claimed invention unless there was some teaching, suggestion or incentive in this prior art which would have made such a combination appropriate. *ACS Hospital Systems*, 732 F.2d at 1577, 221 USPQ at 933; *W.L. Gore*, 721 F.2d at 1551, 220 USPQ at 311. The district court did not elucidate any factual teachings, suggestions or incentives from this prior art that showed the propriety of combination, nor in fact did the district court even point out what teachings from each of the references, when considered in combination, were relied upon in concluding that the invention of claim 10 would have been obvious. Nor apparently did the district court give any consideration to teachings in these references which would have led one skilled in the art away from the invention of claim 10. We would have to say that the district court used claim 10 of the '797 patent as a blueprint, and abstracted individual teachings from the Rothrock patent, MEGSON, and MAKTIN to create the Pep resin of claim 10. *W.L. Gore*, 721 F.2d at 1552, 220 USPQ at 312. This was error as a matter of law.²⁴

²⁴ To properly combine references A and B to reach the conclusion that the subject matter of a patent would have been obvious, case law requires that there must have been some teaching, suggestion, or inference in either reference A or B, or both, or knowledge generally available to one of ordinary skill in the relevant art, which would have led one skilled in the art to combine the relevant teachings of references A and B. See, e.g., *ACS Hospital Systems*, 732 F.2d at 1577, 221 USPQ at 993; *W.L. Gore*, 721 F.2d at 1551, 220 USPQ at 311; *In re Sernaker*, 702 F.2d 989, 994, 217 USPQ 1, 5 (Fed.Cir. 1983). The decision maker's determination as to what objective evidence in reference A or B, or both, or generally available to one of ordinary skill in the relevant art, is of the nature of a factual finding.

The decision maker, however, after making findings as to the objective evidence, must subjectively analyze these factual findings to determine whether the teachings of references A and B could have been combined. Thus, the ultimate determination as to whether references could have been combined is a legal conclusion.

Where the district court fails to set forth the objective bases for its conclusion that references could have been combined, this court will review the determination as a matter of law.

We are not persuaded, based upon the foregoing, that the facts upon which the district court based its legal conclusion that the subject

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matter of claim 10 of the '797 patent would have been obvious were proven by clear and convincing evidence, *Lindemann Maschinenfabrik*, 730 F.2d at 1459, 221 USPQ at 486; *SSIH Equipment*, 718 F.2d at 375, 218 USPQ at 687, such that it cannot be said that Delta had satisfied its burden of proof. Nor was there a sufficient basis for the district court to combine the teachings of the Rothrock patent, MEGSON, and MARTIN. *ACS Hospital Systems*, 732 F.2d at 1577, 221 USPQ at 933. The district court erred as a matter of law in concluding that the invention of claim 10 would have been obvious.

B. THE PROCESS CLAIMS OF THE '797 PATENT

The district court found that the Rothrock patent described a process for manufacturing phenol-formaldehyde resins wherein: (1) a formaldehyde/phenol ratio greater than 1 was taught; (2) the use of paraformaldehyde, the anhydrous form of formaldehyde, was disclosed; (3) a temperature range of 100-120°C was taught; (4) the removal of water was taught in certain examples; and (5) the use of soluble metal salt catalysts including zinc acetate was disclosed. One point of contention²⁵ as to what the Rothrock patent disclosed was whether Rothrock taught one skilled in the art the removal of water during the process which was consonant in scope to the water-removal limitation of the '797 process claims.

²⁵ The Rothrock patent taught that formaldehyde and phenol were condensed in the presence of a mild acid catalyst and a completely volatile, non-gum-forming solvent selected from the class of monohydric aliphatic alcohols and mononuclear aromatic hydrocarbons. Presented testimony, and argued before the district court and this court, that the use of butyl alcohol as the rothrock solvent produced a butyl alcohol modified resin which was not a phenolic resin. The district court made a finding of fact to this effect. Ashland, however, has ignored the teaching of Rothrock that mononuclear aromatic hydrocarbons could have been used as the solvent, and that Example V taught the use of toluene, an aromatic hydrocarbon.

Although the process claims of the '797 patent do not have a specific limitation directed to a solvent, the process claims do require that the phenol and aldehyde be "in the liquid phase." The '797 specification teaches that "[a]lthough it is not necessary to have an inert diluent present, it is generally preferred to conduct the reaction in the presence of one." The '797 specification further teaches that these solvents, when used, are non-polar organic solvents such as aliphatic, cycloaliphatic, aromatic and halogenated hydrocarbons. Toluene is set forth as a specific example of such a solvent.

B.1 Robins' '797 Process

Process claim 1 of the '797 patent, an independent claim, describes a material claim limitation which requires the phenolic-resin producing reaction to be conducted "under substantially anhydrous conditions with the removal of water above 100°C." The materiality of this limitation is disclosed in the '797 specification wherein it is stated that the "failure to continuously remove water not only affects the activity of the catalysts, but also the structure of the product formed, in permitting, for example, para-substitution," and that "the presence of water results in reaction products which cannot be cured to mechanically strong resins by the use of acidic agents at room temperature." (Our emphasis). The specification further discloses that the "process of the present invention is carried out in equipment which will provide for the continuous removal of water from the reaction mixture." (Our emphasis). The water-removal limitation of the process claims of the '797 patent, therefore, requires that water be continuously removed during the polymer formation stage of the reaction, *ACS Hospital Systems*, 732 F.2d at 1577, 221 USPQ at 932 (the claim here in issue is read and construed in light of the specification), i.e., at temperatures above 100°C where the phenol-formaldehyde adduct--a mixture of dimethylol phenols, benzylic ethers and methylene-bridged phenols--is condensed to form the three-ring or greater phenolic resin.

B.2 The Rothrock Process

In contrast, the Rothrock patent in general did not teach or suggest the removal of water during the process described therein, nor was there any teaching or suggestion that the removal of water during the process was a critical limitation. More particularly, there was no teaching or suggestion that water was to be removed during the phenolic resin formation stage of the reaction, i.e., at temperatures above 100 °C. Only Example I of Rothrock disclosed a removal of water, teaching that a small amount of water which had formed on the sides of the reaction flask was removed from the resulting clear liquid formed by the process.²⁶ This water was removed, however, after the resin of the process had been formed,

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i.e., at temperatures well below 100 °C. The equipment for the process of Rothrock as disclosed in the examples did include an air condenser.²⁷ Mr. Kopac testified that there was no disclosure or teaching in the Rothrock patent of the function being performed by the air condenser, and that it could not be said with any certainty that the air condenser functioned to remove or retain water in the reaction zone during the Rothrock process. Examples II, III, IV and VII of the Rothrock patent disclosed that the reaction mixture was heated at reflux.²⁸

²⁶ Contrary to the district court's statement, Example VII of the Rothrock patent did not teach the removal of water. The only statement in Example VII with respect to water was that after the completion of the process, a clear solution was obtained "with traces of water on the sides of the flask."

²⁷ Mr. Kopac testified that an air condensor may be used, and depending upon its length, will condense certain vapors formed during the reaction in a manner so as to reintroduce these condensed vapors back into the reaction zone while unwanted vapors are transported outside of the reaction zone.

²⁸ Dr. Robins' uncontroverted testimony was that reflux meant that water was being distilled from the reaction mixture, condensed, and returned to the reaction mixture.

This disclosure would have suggested to one skilled in the art that water was not removed, nor was there any necessity for doing so, during the reaction process of Rothrock. *W.L. Gore*, 721 F.2d at 1550, 220 USPQ at 311 (a reference must have been considered in its entirety, for disclosures which taught away-from an invention as well as disclosures which directed one to the invention). There was no clear teaching or suggestion in Rothrock that water was to be removed at any step during the condensation process disclosed therein, but rather only after the phenolic condensation was completed. Moreover, the Rothrock reference as a whole suggested that water was retained during the reaction process. See *supra* note 27 and text following, and note 28.

The district court found that the Rothrock patent had not taught the removal of water above 100°C. Yet, the district court subsequently found that one of ordinary skill could have read Rothrock and recognized that varying the solvent in Example V and removing water--as Rothrock had done in Examples I and VII²⁹--yielded a process which could have been substantially similar to the '797 process. These findings by the court are in direct conflict. Since the '797 process claims contain a material limitation directed to "the removal of water above 100°C", *Lemelson*, 752 F.2d at 1551, 224 USPQ at 533, and since the district court found that Rothrock did not teach removal of water above 100°C, there was no basis for the court's finding that the Kothrock process was substantially similar to the '797 process since the Rothrock process lacked this material limitation. See *supra* note 21. Accordingly, we hold that this finding of the district court is clearly erroneous.

²⁹ But see *supra* note 26.

B.3 The Japanese Patent

The Japanese Patent, the court found, described a process for producing phenol-formaldehyde initial condensates, by reacting phenol and formaldehyde: (1) under anhydrous polymerization conditions, i.e., starting with paraformaldehyde and removing water; (2) at temperatures above 100 °C and as high as 120 °C; and (3) using soluble metal salts as catalysts. Further, the district court found that although the examples in the Japanese Patent taught a formaldehyde/phenol ratio less than 1, the specification taught that this ratio could be greater than 1.

While the process disclosed in the Japanese Patent did teach the use of paraformaldehyde, or another substance having the same effectiveness, and the continuous removal of water, the Japanese Patent should have been considered in its entirety, with due consideration given to disclosures that diverged or taught away from the invention here at issue, as well as disclosures which directed one skilled in the art to the invention. *W.L. Gore*, 721 F.2d at 1550, 220 USPQ at 311.

The Japanese Patent disclosed a process for producing a phenol-formaldehyde initial condensate in which phenol was added to a polar solvent such as ordinary alcohol, paraformaldehyde or a substance having similar effectiveness was dissolved into the phenol directly in a molar ratio range of 0.5 - 1.5 of formaldehyde/phenol, and this mixture was reacted in the presence of a weak alkaline catalyst³⁰ with the continuous elimination of water to produce a liquid mixture of 2-methylophenol or 2-

methylolphenol and 2, 6-dimethylolphenol. This resulting liquid mixture was then acidified to induce a condensation reaction to form 2, 2'-dihydroxydiphenyl methane and/or other methylation products. The specification further taught that the hydroxide induced the ortho orientation of formaldehyde in a non-water system and that alkoxyphenoxymethane accelerated the ortho

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linkage during condensation.³¹ The specification further taught that the process reaction could have been effected without dissolving the phenol in a polar solvent, i.e., a solvent need not be used.

³⁰ At one point in the specification the Japanese Patent taught that the alkaline catalyst could be selected from a group consisting of alkaline earth metal hydroxides, magnesium hydroxide, and alkoxyphenoxymethanes -- the process disclosed therein was claimed in this manner -- while at another point in the specification it was taught that both an alkaline catalyst and the alkoxyphenoxymethanes were used to produce the initial methylolphenol products.

³¹ Delta argued that the Japanese Patent emphasized the importance of removing water in the process to produce the ortho-ortho orientation of the resultant phenolic resin. The Japanese Patent, however, taught that "in order to provide the ortho orientation to the resin, it is, of course necessary to select the catalyst having the ortho orientation effect. . ." Although it was taught that both the pH and water content of the reaction system affected the final product, the Japanese Patent clearly indicated that the alkaline catalyst was the dominant factor in producing the ortho-ortho orientation. Since the Japanese Patent disclosed that it was the anhydrous conditions and the alkaline catalyst in combination which produced the ortho-ortho orientation in the resultant product, there was no suggestion or inference therein to one skilled in the art that the removal of water in the Rothrock process, which cannot utilize an alkaline catalyst, would have been advantageous in effecting an ortho-ortho orientation in the resulting resin. *W.L. Gore*, 721 F.2d at 1551, 220 USPQ at 311.

In contrast, the '797 specification teaches that the soluble metal salt catalyst is a metalionically bonded to a salt radical, and that this salt radical should be that of a stronger acid, one having a dissociation constant greater than 10- 8, to prevent cross-linking during the formation of the reaction product. Further, while the process claims of the '797 patent do not incorporate a specific limitation calling for the use of a solvent, the specification discloses that in the preferred embodiment of the process a non-polar organic solvent is utilized. While the Japanese Patent taught that the use of a solvent was optional, it also taught that when a solvent was used, it must have been a polar solvent. *W.L. Gore*, 721 F.2d at 1551, 220 USPQ at 311.

To the extent that the district court concluded that the Japanese Patent by itself would have rendered the subject matter of the process claims of the '797 patent obvious, this conclusion is erroneous as a matter of law. The Japanese Patent clearly taught, at a minimum,³² that an alkaline catalyst, to induce the ortho orientation of the formaldehyde, was a material element of the process. See *supra* note 31. Moreover, the reaction of this process was a two stage reaction wherein the reactants were first exposed to an alkaline catalyst, and the resulting liquid mixture was then acidified to produce the final reaction product. The process claims of the '797 patent, in contrast, do not use an alkaline catalyst, nor is the '797 process a two stage reaction for the formation of a phenolic resin which requires initial reaction of the phenol and formaldehyde with an alkaline catalyst, and then the acidification of the resulting liquid mixture.

³² See *supra* note 30.

To the extent that the district court concluded that the teachings of the Japanese Patent could have been combined with the teachings of the Kothrock Patent to reach the conclusion that the subject matter of the '797 process claims would have been obvious, this conclusion is erroneous as a matter of law. See *supra* note 24. The district court did not point to any teachings or suggestions in either reference which would have led one skilled in the art to perceive an advantage to be derived from their combination. *ACS Hospital Systems*, 732 F.2d at 1577, 221 USPQ at 933; *W.L. Gore*, 721 F.2d at 1551, 220 USPQ at 311. In point of fact, the teachings of the two references would have led one skilled in the art away from their combination. Rothrock taught that his process could not be practiced using an alkali earth metallic hydroxide catalyst. In contrast, the Japanese Patent required such a catalyst. Rothrock required the use of a solvent, which could have been either polar or non-polar while the Japanese Patent taught that the use of a solvent was optional. Further, the Japanese Patent

taught that when a solvent was used, it must be polar. The Japanese Patent also taught that the formaldehyde/phenol ratio could have a range of 0.5-1.5 while Rothrock required that the ratio must be greater than 1.

B.4 The Fraser Reference

The district court found that the Fraser reference taught the effectiveness of zinc and lead as catalysts to form ortho-ortho linked phenol-formaldehyde chains and that ether bridges were formed at reaction temperatures below 140°C. The court also found, however, that the Fraser reference did not teach the removal of water above 100°C and that the method of Fraser did not produce compounds having more than two phenol rings.

A reference, however, should also have been considered for its antithetical teachings. *W.L. Gore*, 721 F.2d at 1550, 220 USPQ at 311. One of the critical teachings of Fraser was that the formaldehyde/phenol ratio must be less than 1, i.e., a molar excess of phenol was required for the method. It would be error as a matter of law if the district court concluded that the subject matter of the process claims of the '797 patent would have been obvious in view of the Fraser reference alone. Nor was there any teaching or suggestion that would have led one skilled in the art to combine the teachings of the Fraser reference with either

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the teachings of the Rothrock patent or the teachings of the Japanese Patent, or both. *ACS Hospital Systems*, 732 F.2d at 1577, 221 USPQ at 933.

B.5 Conclusion

We held *supra* that the district court's finding that the Rothrock process was substantially similar to the process of the '797 patent was clearly erroneous. Further, we are not persuaded that the other facts, discussed *supra*, which the district court relied upon in reaching its legal conclusion that the subject matter of claims 1, 2, and 7 of the '797 patent would have been obvious, were proven by clear and convincing evidence, *Lindemann Maschinenfabrik*, 730 F.2d at 1459, 221 USPQ at 486; *SSIH Equipment*, 718 F.2d at 375, 218 USPQ at 687, such that it cannot be said that Delta had sustained its burden of proof before the district court. It was error as a matter of law for the district court to conclude that processes of claims 1, 2 and 7 of the '797 patent would have been obvious. ³³

³³ It appears that the district court used process claim 1 of the '797 patent as a blueprint, and abstracted individual teachings reference to create and process of claim 1, without due consideration for teachings in these references that would have led one skilled in the art to find it improper to combine these references. *W. L. Gore*, 721 F.2d at 1552, 220 USPQ at 312.

C. THE CLAIMS OF THE '392 AND '579 PATENTS

Claim 17 of the '392 patent is directed to a foundry mix having sand as the major constituent and up to 10 percent by weight of sand of a resin composition. The resin composition comprises in admixture a benzylic ether resin substantially similar to the phenolic resin claimed in claim 10 of the '797 patent, ³⁴ a hardener component defined as a liquid polyisocyanate, and a curing catalyst defined as a base having a pK_b value in the range of about 7 to about 11. Claim 14 of the '579 patent is directed to a foundry mix similar to that of claim 17, except that the phenolic resin of the binder composition is the resin as claimed in claim 10 of the '797 patent, and the curing agent is defined as a tertiary amine. Claim 19 of the '579 patent is directed to a process for preparing foundry shapes using the foundry mix of claim 14.

³⁴ The phenolic resin of claim 10 of the '797 patent is defined such that m and n are numbers the sum of which is at least 2 and the ratio of m to n is greater than 1. In contrast, the benzylic ether resin as claimed in the foundry mix of claim 17 of the '392 patent is defined such that m and n are numbers the sum of which is at least 2, and wherein m is at least 1.

C.1 General Level of Skill in the Art

The district court found that British Patent No. 1,031,909, although technically not prior art, was indicative of what was generally known during the relevant time frame to persons of ordinary skill in the foundry art. Finding that the British Patent described reacting novolac resins with highly reactive divalent materials ³⁵ to produce soluble, fusible polymers which may be employed "as binders for sand

(foundry resins)", the court concluded that the British Patent disclosed the use of phenolic urethanes as foundry binders.³⁶ The court also found that U.S. Patent Nos. 3,398,122 and 3,409,571 (the '122 and '571 patents, respectively), issued to Shepard, were significant for a teaching that phenolic urethanes were useful as constituents of foundry binders. Shepard, the court found, described a soluble thermoplastic, i.e., a novolac phenolic resin modified with a phosphorous compound, which could be mixed with polyisocyanates to form thermosetting products useful in foundry sand binders. Based upon the district court's findings with respect to the Shepard references, we cannot say that the district court erred in concluding that phenolic urethanes were taught as having utility in foundry binders.

³⁵ The specification described these highly reactive divalent materials as "[a]ny diisocyanate in which the isocyanate groups are the sole reactive groups. . . ."

³⁶ Keeping in mind the admonishment that a disclosure should have been read in its entirety for all it divulged, *W.L. Gore*, 721 F.2d at 1550, 220 USPQ at 311, we have reservations about this finding of the district court. The specification of the British Patent stated that "[a]s far as [the inventors] are aware, soluble, fusible polymers which are the products of the reaction of a novolac resin and a highly reactive divalent material capable of condensing with phenolic hydroxyl groups have not heretofore been performed." The specification further stated that "the reaction of a conventional novolac polymer with such divalent reactants results in the production of the expected insoluble, infusible thermoset materials." From these disclosures in the British patent we would not say it was a foregone determination that the use of phenolic urethanes, prepared by the reaction of a resin with an isocyanate, in foundry mixes was known to those of ordinary skill in the foundry art as of the critical date.

C.2 The Shepard Patents

The district court found that one skilled in the art "could also readily sense that the 'Pep'

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resin might be substituted into the Shepard patent." Since it was known in the prior art how ether bridges and hydroxyl groups reacted with polyisocyanates,³⁷ one of ordinary skill in the art could have looked at the Rothrock patent, MEGSON and MARTIN, analyzed their teachings in light of the Shepard patents and the British Patent,³⁸ and concluded that a polybenzylidene ether resin could have been plugged into Shepard to produce a phenolic urethane foundry binder.

³⁷ On appeal, both Ashland and Delta have pointed out that this statement by the district court is technically incorrect in part. While polyisocyanates do react with hydroxyl groups, they do not react with benzylidene ether bridges.

³⁸ The district court made a finding that the British Patent was not prior art. Therefore, the district court could only have utilized the British Patent in the "analysis" to the extent that the British Patent showed the general level of skill in the art as of the critical date. Cf. *In re Farrenkopff*, 713 F.2d 714, 219 USPQ 1 (Fed.Cir. 1983). But see *supra* note 36.

The district court's conclusion that the Pep resin might have been substituted for the phenolic condensate used in the Shepard patent is erroneous as a matter of law, for several alternative reasons.³⁹ First, the district court failed to consider the '571 patent in its entirety in particular for these teachings therein that would have led one skilled in the art away from the subject matter of the '392 and '579 patents. *W.L. Gore*, 721 F.2d at 1550, 220 USPQ at 311. The specification of the '571 patent taught that the thermoplastic products of the invention could be used to produce thermosetting products by curing the thermoplastic products with agents such as, *inter alia*, polyisocyanates. The specification disclosed further that these thermoplastic products and/or thermosetting products were useful as foundry sand binders.

³⁹ Based upon the discussion *infra*, it is not necessary to review the factual findings made by the district court with respect to tertiary amines and curing catalysts having a pk_b value in the range of about 7 to about 11.

But, the district court failed to consider what these thermoplastic products were disclosed to comprise. The '571 specification disclosed that these thermoplastic products were polymeric esters characterized in that:

(1) a major portion of the moiety of the member of the phosphorus family has the formula:

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA at 1-800-372-1033.

in which the unsatisfied bonds are attached to aryl nuclei of the same phenolic condensate, and in which M is an atom of the phosphorus family, Y is oxygen or sulfur, and X is halogen, hydroxyl, mercapto, hydrocarbyl, hydrocarbyloxy, halogen-substituted hydrocarbyl, halogen-substituted hydrocarbyloxy, or an aryloxy radical of the same phenolic condensate to which M is attached;

(2) at least 60 percent of the phenol-aldehyde or phenol-ketone condensate had o,o'alkylidene linkages, and;

(3) the phenolic condensate has an average number of aryl nuclei per molecule in the range of 2.2 to 8.

Thus, the '571 specification taught that the thermoplastic product was more than a phenolic condensate. It was a phenolic condensate wherein a phosphorus-containing moiety had its unsatisfied bonds attached to the aryl nuclei of the same phenolic condensate. Even assuming arguendo that one skilled in the art might readily have sensed that the Pep resin of the '797 patent might have been used as the phenolic condensate called for by the Shepard patent, Shepard taught only that it was the polymeric ester or thermoplastic product, i.e., the phenolic condensate in combination with the bonded phosphorus-containing moiety, that could be reacted with polyisocyanates or tertiary amines to produce thermosetting products having utility in foundry sand binders. But, the teachings of Shepard did not disclose to one skilled in the art whether the phenolic condensate, by itself, would have had utility as a thermosetting product.

The district court found that one of ordinary skill in the art would have looked at the Rothrock patent, MEGSON, and MARTIN, analyzed their teachings in light of the Shepard and British patents,⁴⁰ and concluded that a polybenzylic ether resin could have been plugged into Shepard to produce a phenolic urethane binder. Based upon our holdings in Section "A. CLAIM 10 OF THE '797 PATENT -- PEP RESIN," *supra*, this conclusion is erroneous as a matter of law. In Section A we held that the Rothrock patent, MEGSON, and MARTIN, considered singly would not have led to the conclusion that the Pep resin as claimed in claim 10 of the '797 patent would have been obvious, and that there was no basis for combining the teachings of these references, such that one skilled in the art would not

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have had knowledge of the Pep resin as of the critical period. Therefore, there was no proper basis for the district court to conclude that one skilled in the art, even with knowledge of the teaching of the Shepard patent with respect to the utility of phenolic urethanes as foundry binders, would have had knowledge of a phenolic resin substantially similar to the phenolic resin as claimed in claim 10 of the '797 patent. Therefore, it was erroneous to conclude that the Pep resin of the '797 patent could have been substituted into the Shepard patent for use in producing a phenolic urethane foundry binder as taught in the Shepard patent.

⁴⁰ See *supra* note 38.

C.3 Combining Prior Art with the Shepard Patents

Moreover, assuming for the sake of argument that the Rothrock patent, MEGSON, and MARTIN would have led one skilled in the art to a phenolic resin substantially similar to the phenolic resin as claimed in claim 10 of the '797 patent, the '571 patent contained relatively little in the way of positive suggestion or inference which would have led one skilled in the art to combine the teachings of these references with the Shepard patent. *ACS Hospital Systems*, 732 F.2d at 1577, 221 USPQ at 933. The '571 patent taught two methods for the preparation of phenolic condensates having a high percentage of ortho-ortho alkylidene linkages.

The preferred phenolic condensate was prepared by reacting an excess of phenol with formaldehyde, i.e., a phenol/formaldehyde ratio greater than 1, in the presence of an inorganic alkali catalyst. In contrast, the Rothrock patent taught a formaldehyde/phenol ratio of 1:1, or a range of 1:63 to 1:1. Further, the Rothrock patent taught that the resins thereof could not be produced in the presence of alkali catalysts.

The alternative process for producing the phenolic condensates described in the '571 patent involved

reacting an aldehyde with a phenol in the presence of an acid catalyst. The ratio of formaldehyde/phenol was described as being in the range of 0.5 to 1.0, with the preferred range being 0.7 to 0.9. Thus, while the '571 patent taught a formaldehyde/phenol ratio range wherein the upper bound minimally overlapped the lower bound of the Rothrock patent formaldehyde/phenol ratio, the preferred range taught in the '571 patent diverged away from the ratio as taught in Rothrock. The '571 patent also taught that the acid catalyst could be hydrochloric, sulfuric or oxalic acids, and was silent as to the need for a solvent to effect condensation. The Rothrock patent, in contrast, taught that condensation occurred in the presence of both a mild acid catalyst, such as zinc acetate, boric acid, or copper acetate, and a completely volatile, non-gum-forming solvent, and further that resins could not be produced in the presence of strongly acidic catalysts, such as hydrochloric acid. Since the '571 patent appeared to have suggested stronger acid catalysts than those usable in the Rothrock patent, and was silent as to the use of a solvent, an uncertainty would have arisen as to whether the teachings of the Rothrock patent could have properly been combined with the teachings of the Shepard patent.

A further point is that the '571 patent taught that the phenolic condensate of the novel ester was one having at least 60 percent ortho-ortho alkylidene linkages. The specification disclosed that the term alkylidene expressed the structural relationship of the substituted methylene residues of the aldehyde to the phenolic nuclei of the phenolic condensates and that the term was intended to be generic to all such substituted methylene groups defined within the scope of the invention, and further taught that the phenolic condensates most useful in the invention were characterized by R₂-C-R₂linkages, wherein R₂could be independently selected from the group consisting of hydrogen, a hydrocarbon radical, and a halogen-substituted hydrocarbon radical. This teaching would have seemed to preclude the teachings of the Rothrock patent being combined with the teachings of the '571 patent inasmuch as the phenolic resin of the Rothrock patent which would have been substantially similar to the resin as claimed to claim 10 of the '797 patent would have had a majority of ether linkages,⁴¹ not alkylidene linkages.

⁴¹ Claim 10 of the '797 patent requires that the phenolic resin claimed therein must have a ratio of m to n of greater than 1. To satisfy this constraint, m must be greater than n such that the number of benzylic ether bridges is always greater than 50 percent. The benzylic ether bridges are defined by the chemical formula CH₂-O-CH₂, and as such contain oxygen. In contrast, the specification of the '571 patent teaches that the preferred phenolic condensate must have at least 60 percent ortho-ortho alkylidene bridges, and that these bridges do not contain oxygen.

D. SECONDARY CONSIDERATIONS

The district court stated that it had considered relevant ⁴² secondary considerations prior

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to reaching conclusion that the subject matter of the claims in issue of the '392 and '579 patents would have been obvious. Thus, the district court seemingly recognized the holdings of this court vis-a-vis secondary considerations, to wit, that all relevant evidence going to the issue of obviousness/nonobviousness, which includes properly presented evidence on secondary considerations, must have been considered prior to reaching a conclusion on obviousness/nonobviousness. *Fromson*, 755 F.2d at 1556-57, 225 USPQ at 32; *W.L. Gore*, 721 F.2d at 1555, 220 USPQ at 314.

⁴² Case law requires that a nexus be established between the merits of the claimed invention and the evidence proffered on secondary considerations, if the evidence on secondary considerations is to be given substantial weight in the calculus of obviousness/nonobviousness. *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575, 222 USPQ 744, 746 (Fed.Cir. 1984), cert. denied, 105 S.Ct. 2138 (1985); *Stratoflex*, 713 F.2d at 1539, 218 USPQ at 879.

Ashland argued that the merits of its phenolic urethane foundry binder mixes -- Isocure and Pep Set--were due to the characteristics of the phenol-formaldehyde resin, i.e., the Pep resin, substantially as claimed in claim 10 of the '797 patent. See *supra* note 34 and accompanying text. The district court did not make any explicit finding as to the nexus between the merits of the claimed invention and the proffered secondary considerations.

The district court at one point in the opinion stated that the Pep resin is an ingredient in Ashland's Isocure and Pep Set foundry binder mixes. The court stated that the main

advantage of these products was the speed and timing of the cure, i.e., the "S" or "Z" cure curve, which increases foundry productivity.

Delta had argued before the district court that Ashland's Isocure and Pep Set Foundry products were not covered by the '579 and '392 patents, respectively, because the Isocure and Pep Set foundry products have only an average of 2.5 phenol rings per molecule, whereas the claims of the '579 and '392 patents require an average of 3 or more phenol rings per molecule. The district court stated that since it had found the patents in suit to be invalid for obviousness under §103, there was no need to determine whether the patents in suit covered Ashland's products. This was error as a matter of law. For secondary considerations to have probative value, the decision maker must determine whether there is a nexus between the merits of the claimed invention and the secondary considerations. *Simmons Fastener Corp.*, 739 F.2d at 1575, 222 USPQ at 746; *Stratoflex*, 713 F.2d at 1539, 218 USPQ at 879. Under the circumstances of this case, Ashland's preferred evidence of secondary considerations cannot properly be considered in reaching a conclusion on obviousness/nonobviousness unless the decision maker first determines that these secondary considerations are relevant to the subject matter as claimed. For example, had the decision maker made this determination in this case, and determined that the Isocure and Pep Set products were not covered by the '579 and '392 patents, respectively, then the secondary considerations would not have had any relevance to the obviousness/nonobviousness determination.

The district court, however, also averred that the law was well established that commercial success alone, or considered in combination with other secondary considerations, is insufficient to establish patentability where primary indicia of patentability was lacking.⁴³ Just as it is legal error for a district court to fail to consider relevant evidence going to secondary considerations, *Lindemann Maschinenfabrik*, 730 F.2d at 1461, 221 USPQ at 488, it may be legal error for a district court to presuppose that all evidence relating to secondary considerations, when considered with the other *Graham*⁴⁴ indicia relating to the obviousness/nonobviousness issue, cannot be of sufficient probative value to elevate the subject matter of the claimed invention to the level of patentable invention. *Fromson*, 755 F.2d at 1556-57, 225 USPQ at 32; *Union Carbide*, 724 F.2d at 1573, 220 USPQ at 589 (this court reviews the issue of obviousness as one of law on which it must exercise independent judgment--we must be convinced not only that the decision maker engaged in faulty analysis in applying the law to the facts, but also that a correct application of the law to those facts would bring a different result).

⁴³ For support for this proposition the district court cited to: *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273, 283, 189 USPQ 449, 453, *ren'd denied*, 426 U.S. 955 (1976) (1976) ("[P]roducing a desired result in a cheaper and faster way, and enjoying commercial success 'without invention will not make Patentability.' "); *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 153, 87 USPQ 303, 306 (1950), *reh'd denied*, 340 U.S. 918 (1951) ("But commercial success without invention will not make patentability."); and *Eltra Corp. v. Basic, Inc.*, 599 F.2d 745, 756, 202 USPQ 630, 640 (6th Cir.), cert. denied, 444 U.S. 942, (1979) ("Of course, commercial success and satisfaction of long-felt needs are alone not sufficient to establish that the product is the result of invention.")

⁴⁴ *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966).

The objective evidence of secondary considerations may in any given case be entitled to more or less weight, depending upon its nature and its relationship to the merits of the invention. *Stratoflex*, 713 F.2d at 1539, 218 USPQ at 879. Secondary considerations may be the most pertinent, probative, and revealing evidence available to the decision maker in reaching a conclusion on the obviousness/nonobviousness issue. *W.L. Gore*, 721 F.2d at 1555, 220 USPQ at 314.

While it is incumbent upon the decision maker to recognize that evidence of secondary considerations need not be necessarily conclusive on the obviousness/nonobviousness issue, *Fromson*, 755 F.2d at 1557, 225 USPQ at 32, the decision maker must also bear in mind that, under certain circumstances, the evidence of secondary considerations may be particular

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ly strong and entitled to such weight that it may be decisive. For example, in *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575-76, 222 USPQ 744, 747 (Fed.Cir. 1984), the trial court concluded that the claimed invention would have been obvious in light of the teachings of the prior art. But, the trial court had failed to consider the evidence going to secondary considerations in

arriving at this conclusion. Holding that the trial court erred as a matter of law by failing to consider the evidence of secondary considerations prior to arriving at its legal conclusion, this court, after considering the teachings of the prior art and the secondary considerations, reversed the decision of the district court.

While the district court in this case found the evidence of commercial success of the chemical sand binders claimed in the '392 and '579 patents impressive, the court found countervailing considerations in the evidence that: (1) after the Milwaukee litigation, see *supra* note 5, one Ashland licensee had effected a downward renegotiation of its royalty payment after initiating a declaratory judgment action against Ashland on the patent claims here in issue; (2) another Ashland licensee went out of the business approximately one year after the grant of the license; (3) industry recognition of the chemical sand binders as claimed in the '392 and '579 patents was directed more towards the marketing of these products rather than the invention thereof; and (4) Dr. Robins, the inventor listed in the '797, '392, and the '579 patents, had not received any recognition from the industry and only a small monetary consideration from Ashland for his role in developing these inventions. On the record before this court, we cannot say that these factual findings made by the district court were clearly erroneous. See *supra* note 13.

The record also reveals, however, that Ashland proffered other evidence of secondary considerations, to wit: (1) affidavits from its industrial customers attesting to the long-felt need satisfied by these chemical sand binders produced by Ashland; (2) the unexpected results, i.e., the "S" or "Z" cure curve, achieved by the '392 and '579 foundry mixes; and (3) the alleged copying by Delta of these chemical sand binders. The opinion rendered by the district court did not discuss these secondary considerations, see also *supra* note 42, and they apparently were not accorded any probative value or entered into the final calculus on the issue of obviousness/nonobviousness. This was error as a matter of law. *Lindemann Maschinenfabrik*, 730 F.2d at 1461, 221 USPQ at 488.

Where the evidence of record is unchallenged as to secondary considerations ignored by the decision maker, this court may, as a matter of law, consider this objective evidence in reviewing the ultimate conclusion of obviousness/nonobviousness entered by the trial court. *Id.*, 221 USPQ at 488. However, where this evidence of record is controverted, as it is in this case, this court will normally remand to the district court for its initial consideration of this evidence. Under the circumstances of this case, however, where we have held that the prior art of record is insufficient to support the legal conclusion of obviousness rendered against the '392 and '579 patents, remand for the district court's consideration of the other evidence going to secondary considerations is not necessary. Nor is it necessary for this court to determine whether a proper consideration of this evidence would have resulted in a different conclusion as to the obviousness of the '392 and '579 patents by the district court. *Union Carbide*, 724 F.2d at 1573, 220 USPQ at 589.

E. CONCLUSION

[1] We have held that the district court committed reversible error in combining the teachings of the Rothrock patent, MEGSON, and MARTIN to reach the conclusion that the subject matter of claim 10 of the '797 patent would have been obvious, and further, that these references, considered individually, would not have supported a conclusion that the subject matter of claim 10 would have been obvious.

We have further held that the district court committed reversible error in combining the teachings of the Rothrock patent, the Japanese patent, and Fraser to conclude that the invention of process claims 1, 2, and 7 of the '797 patent would have been obvious, and that these references, considered singly, would not have supported a conclusion that the invention of these process claims would have been obvious.

We have also held that, inasmuch as one of ordinary skill in the art would not have had knowledge of the Pep resin as claimed in claim 10 of the '797 patent, there was no basis to substitute this resin into the Shepard patent and conclude that the foundry binder inventions of the '392 and '579 patents would have been obvious. Further, as a matter of law there was no basis in either the Shepard patent or the other prior art relied upon by the district court which would have led one skilled in the art to combine the teachings of this prior art with the teachings of the Shepard patent.

Finally, we have held that the district court erred as a matter of law in failing to consider all evidence going to the secondary considerations. And further, that the district court erred by failing to determine if there was the

claimed inventions of the '392 and '579 patents.

Accordingly, the decision of the district court that claims 1, 2, 7 and 10 of the '797 patent, claims 14 and 19 of the '579 patent, and claim 17 of the '392 patent are invalid is *reversed*.

The case is *remanded* for consideration of the infringement issue.

REVERSED AND REMANDED.

APPENDIX

MEGSON, PHENOLIC CHEMISTRY, 29

(Academic Press Inc. 1958)

DETAILED SURVEY

with a dimethylene ether. It is believed, however, that methylene-bridged phenols are important constituents of resins resulting from the hardening of the alcohols, and if these are formed from the benzyl ethers, then elimination of formaldehyde should be much greater than that actually observed in the second stage of heating.

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA at 1-800-372-1033.

It appears, therefore, that much of the formaldehyde must recombine, and three methods are mentioned by which it can do this. The first involves reaction with nuclear hydrogens to give cross-linked methylene derivatives (A); the second involves reaction with phenolic hydroxyls to yield cross-linked ethers (B); the third involves reaction with methylene groups (when formed) to give cross-linked compounds of a different type (C).

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA at 1-800-372-1033.

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All these reactions would explain the low evolution of formaldehyde and the high evolution of water during the second stage of hardening.

- End of Case -

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USPQ, 2d Series (1986 - Present) > U.S. Court of Appeals, Federal Circuit > Demaco Corp. v. F. Von Langsdorff Licensing Ltd., 7 USPQ2d 1222 (Fed. Cir. 1988)

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7 USPQ2d 1222

Demaco Corp. v. F. Von Langsdorff Licensing Ltd. U.S. Court of Appeals Federal Circuit

No. 86-1439

Decided June 21, 1988

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Headnotes

PATENTS

[1] Patentability/Validity -- Obviousness -- Relevant prior art (► 115.0903)

Invention need not be complex or superior to previous devices in order to be non-obvious.

[2] Patentability/Validity -- Obviousness -- Secondary considerations generally (► 115.0907)

Federal district court erred, in holding claims invalid for obviousness, by determining that secondary considerations were not significant due to clear indication of obviousness based on prior art, since commercial response to invention is significant to obviousness determination and is entitled to fair weight, and since secondary considerations provide objective evidence of how patented device is viewed in marketplace by those directly interested in product.

[3] Patentability/Validity -- Obviousness -- Commercial success (► 115.0908)

Patentee which asserts commercial success to support its contention of non-obviousness bears burden of proof of establishing nexus between proven success and patented invention, and *prima facie* case of nexus is established by evidence of commercial success and by demonstrating that commercially successful product or method is invention disclosed and claimed in patent, and if commercially successful product is not co-extensive with patented invention then patentee must show legally sufficient relationship between that which is patented and that which is sold, although patentee need not show that commercial success of patented invention is not due to factors other than patented invention.

[4] Patentability/Validity -- Obviousness -- Commercial success (► 115.0908)

Patentee's *prima facie* showing of nexus between proven success and patented invention shifts burden to challenger to demonstrate that commercial success was due to extraneous factors other than patented invention, such as advertising or superior workmanship.

[5] Patentability/Validity -- Fraud or inequitable conduct (► 115.15)

Federal district court erred by holding patent unenforceable for intentional withholding of material prior art, in view of lack of clear and convincing evidence to demonstrate deliberate intent to conceal, or evidence sufficient to establish gross negligence of such gravity as to warrant inference of intent to deceive or mislead.

Particular Patents

Particular patents -- General and mechanical -- Paving stones

4,128,357, Barth and Langsdorff, concrete slab-elements for covering ground having specific shape and proportion, finding of non-infringement reversed.

Case History and Disposition

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Appeal from the U.S. District Court for the Middle District of Florida, Castagna, J.

Demaco Corp. brought action seeking declaratory judgment of patent validity against F. Von Langsdorff Ltd and F. Von Langsdorff Bauverfahren, GmbH. From decision holding claims 9, 13, and 29-33 invalid for obviousness and unenforceable for inequitable conduct, defendants appeal. Reversed and remanded; Archer, J., concurring with opinion.

Attorneys

Russell D. Orkin and Webb, Burden, Robinson & Webb (Richard L. Byrne, on brief), Pittsburgh, Pa., for plaintiff-appellee.

Albert C. Johnston and St. Onge, Steward, Johnston & Reens (William J. Speranza and Michael L. Goldman, on brief), Stamford, Conn., for defendants-appellants.

Judge

Before Friedman, Newman, and Archer, circuit judges.

Opinion Text**Opinion By:**

Newman, J.

F. Von Langsdorff Bauverfahren GmbH and F. Von Langsdorff Licensing Ltd. (together "Langsdorff") appeal the judgment¹ in favor of declaratory judgment plaintiff Demaco Corporation and counterclaim defendants Coastal Contracting Corporation, Paver Systems, Inc., and R. I. Lampus Company (together "Demaco"). The United States District Court for the Middle District of Florida, Tampa Division, held that claims 9, 13, and 29-33 of United States Patent No. 4,128,357 ("the Barth patent") are invalid for obviousness under 35 U.S.C. §103, that all of the claims are unenforceable for inequitable conduct, and thus that the patent is not infringed. We reverse.

¹ *Demaco Corporation v. F. Von Langsdorff Licensing Ltd.*, No. 84-1051-CIV-T-15 (M.D. Fla. May 22, 1986) (amended April 1, 1987).

The Patented Invention

The patent claims here at issue are for a paving stone of specific shape and proportion, as illustrated in claim 9, an agreed "typical" claim (as rewritten in independent form):

9. Ground covering slab elements for paving ground areas, each of said elements being a single piece of concrete consisting of a head portion and a stem portion meeting at a dummy groove allowing, but not necessitating, breakage of said slab elements into heads and stems along said dummy grooves and being delimited by two opposite end faces of equal length joined by opposite sides that form angled traces about a longitudinal axis common to said head and said stem, each said angled trace being formed by a succession of sides comprising at said head an inclined side face inclined at 45° in one direction relatively to said axis, a lateral side face extending lengthwise with respect to said axis, and another inclined side face inclined at 45° in the opposite direction with respect to the said axis, and comprising at said stem a lateral side face extending lengthwise with respect to said axis, each said lateral face of said stem being complementary to a lateral face of said head, said end face of said head together with said inclined sides of said head and said lateral faces of said head and said dummy groove describing a centrally symmetrically [sic] octagon, said dummy groove together with said end face of said stem and said lateral faces of said stem being symmetrical about the center of said stem, and said head and said stem being mirror symmetrical about said longitudinal axis, wherein said end face of said head, said lateral faces of said head, said inclined sides of said head and said dummy groove together describe an octagon, with equal lengths of said end face, said lateral faces and said dummy groove, and with equal lengths of said inclined sides of said head, wherein said inclined sides of

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said head are each shorter than said end face of said head.

Appellant Langsdorff describes the advantages of the Barth paving stone as combining the feature of structural strength obtained from an elongated, interlocking paver, with the feature whereby, however the asymmetric stone is laid, the effect is the same symmetrical pattern. These characteristics are illustrated in the brochure of one of the accused infringers, wherein the Barth stone is shown along with another commercial paving stone laid in the same patterns:



The Barth result is achieved by using the claimed paving stone.

Validity -- 35 U.S.C. §103

A

Reexamination was requested on behalf of Langsdorff on December 2, 1982, and on behalf of Demaco on January 12, 1983. Both requesters brought new references before the United States Patent and Trademark Office ("PTO"). During reexamination the examiner confirmed some of the claims without change, Barth dropped some claims, and some new claims were added. The examiner gave the following reasons for allowing the claims:

Claims 9 and 29-33 are considered to be allowable because the prior art does not suggest a paving stone having a head shaped as an octagon with a square stem separated by a dummy groove in which inclined sides of the head are each shorter than the end face of the head.

Claim 13 is considered patentable because the prior art does not suggest a composite pavement formed by laying plural elements having an octagon head with a square stem separated by a dummy joint [laid] in a herringbone pattern as specified. Claims 20-28 are considered allowable because the prior art does not suggest a paving stone having the specific corner angles and indentations as specified.

After the PTO issued the reexamination certificate Demaco filed this declaratory judgment action. Following a trial to the bench, the district court held asserted claims 9, 13 and 29-33 invalid for obviousness. Langsdorff argues that the district court erred in its factual findings and in its application of the law.

Langsdorff asserts that a paving stone having the structure of the Barth paver, combining its ten-sided elongated shape with its appearance of an octagon joined to a square, and accompanying structural and visual advantages, is not shown or suggested in the prior art. Langsdorff argues that even if retrospectively simple in concept, the Barth paving stone was "a new product in a millennia old art". Langsdorff thus argues that the district court did not understand the invention, pointing to the court's statement that

The essence of the advance made by the Barth paver is to accomplish with one piece of concrete that which could be accomplished with one square piece and one octagonal piece by joining the square to the octagon.

as demonstrating that the court believed that Barth had simply joined two paving blocks into one.

The prior art showed paving stones having the general elongated shape of the Barth stone but without the dummy groove; and the geometrical figure of an octagon joined to a square was shown in mathematics texts. The prior art also showed other paving shapes having dummy grooves. The claimed relative dimensions are not shown in the prior art. Langsdorff further states, without apparent contradiction, that this symmetrical paving stone pattern giving the appearance of two different stones is not shown or suggested in the art. Nor does the prior art describe or suggest a stone that gives to paving the structural strength obtained here while achieving a harmonious appearance whatever the pattern in which the stones are laid. Langsdorff presented evidence that it is the overall shape that provides the traffic load strength, by enabling an interlocking pavement.

[1] The district court held that the Barth stone gave "no significant structural advantage . . . over other pavers", and that "there is no evidence that the Barth paver makes a stronger or more durable pavement". The

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patent statute does not require that a patentable invention be superior to all prior devices. *Custom Accessories, Inc. v. Jeffrey-Allan Industries, Inc.*, 807 F.2d 955, 960 n.12, 1 USPQ2d 1196 , 1199 n.12 (Fed.Cir. 1986) ("Finding that an invention is an 'improvement' is not a prerequisite to patentability"); G. Rich, *Principles of Patentability* , 28 Geo. Wash.L.Rev. 393, reprinted in 42 J.Pat. Off. Soc'y 75 (1960) (discussing; "the unsound notion that to be patentable an invention must be

better than the prior art"). Nor does the patent statute require that an invention be complex in order to be nonobvious. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1572, 1 USPQ2d 1593, 1600 (Fed.Cir.), cert. denied , 107 S.Ct. 2187 (1987):

Though technology has burgeoned, the patent system is not limited to sophisticated technologies Nowhere in the statute or the Constitution is the patent system opened only to those who make complex inventions difficult for judges to understand and foreclosed to those who make less mysterious inventions a judge can understand

See also *van Veen v. United States* , 386 F.2d 462, 465, 156 USPQ 403, 405 (Ct.Cl. 1967) ("Experience has shown that some of the simplest advances have been the most nonobvious").

It was not disputed that the Barth stone possessed a combination of advantages not obtained with prior pavers. Indeed, the chairman of accused infringer Paver Systems testified to that effect:

Q: It's true, is it not, that the herringbone bond lay of paving stones is quite important to the strength of the pavement under traffic load?

A: Yes.

Q: In fact, your company has stressed that in its brochures, has it not?

A: Yes.

Q: Isn't there an advantage in having a stone suitable of a variety of bonds including herringbone rather than herringbone bond only?

A: Yes.

Q: Is it true from your experience that when one lays multiple pavers of the [Langsdorff] shape, no matter in which orientation they are laid the resultant pavement will have the same surface appearance pattern?

A: Yes.

Q: Now, do you know of any [interlocking] paving stone that was ever produced and sold in the United States or Canada that has the two characteristics of being suitable for a variety of bonds, including herringbone, and when laid in a variety of bonds in a pavement shows the same surface appearance in the pavement?

A: No.

We conclude that the district court clearly erred in its analysis of the differences between the Barth paver and the prior art.

B

[2] The district court held that "secondary considerations are not significant in this case because first, the prior art so clearly indicates obviousness. . . ." This misstates the law. See *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.* , 776 F.2d 281, 306, 227 USPQ 657, 674 (Fed.Cir. 1985), cert. denied , 475 U.S. 1017 (1986) ("evidence on secondary considerations must have been considered prior to reaching a conclusion on obviousness/nonobviousness"). This court wrote in *Stratoflex, Inc. v. Aeroquip Corp.* , 713 F.2d 1530, 1538-39, 218 USPQ 871, 879 (Fed.Cir. 1983):

Indeed, evidence of secondary considerations may often be the most probative and cogent evidence in the record. It may often establish that an invention appearing to have been obvious in light of the prior art was not. It is to be considered as part of all the evidence, not just when the decisionmaker remains in doubt after reviewing the art.

The commercial response to an invention is significant to determinations of obviousness, and is entitled to fair weight. *Graham v. John Deere Co.* , 383 U.S. 1, 35-36, 148 USPQ 459, 474 (1966); *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.* , 730 F.2d 1452, 1461, 221 USPQ 481, 487 (Fed.Cir. 1984). The rationale for giving weight to the so-called "secondary considerations" is that they provide objective evidence of how the patented device is viewed in the marketplace, by those directly interested in the product. See *Graham* , 383 U.S. at 35-36, 148 USPQ at 474:

These legal inferences or subtests do focus attention on economic and motivational rather than technical issues and are, therefore, more susceptible of judicial treatment than are the highly technical facts often present in patent litigation.

and *Safety Car Heating & Lighting Co. v. General Electric Co.* , 155 F.2d 937, 939, 69 USPQ 401, 403 (2d Cir. 1946) (L. Hand, J.):

Courts, made up of laymen as they must be, are likely either to underrate, or to overrate, the difficulties in making new and profitable discoveries in fields with

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which they cannot be familiar; and, so far as it is available, they had best appraise the originality involved by the circumstances which preceded, attended and succeeded the appearance of the invention.

Although the district court concluded that commercial success "is an insignificant factor in this case", the record is to the contrary. At trial Demaco's counsel stated that:

The patent has been copied . . . Half of the industry are [licensees] . . . the other half are fighting this particular patent . . .

The court held that Langsdorff's licensing success was "attributable to marketing efforts seeking broad relationships with licensees including several products, advertising, and technical assistance going beyond the monopoly on the Barth paver", and concluded that it had not been proved "that purchasers seek the product due to its inherent qualities as opposed to other paving stone or nonpaving stone ground covering products." Langsdorff argues that the issue is not whether Langsdorff had a successful licensing program, but whether the patented invention was successful in the marketplace. That success was admitted by Demaco.

[3] When a patentee asserts that commercial success supports its contention of nonobviousness, there must of course be a sufficient relationship between the commercial success and the patented invention. The term "nexus" is often used, in this context, to designate a legally and factually sufficient connection between the proven success and the patented invention, such that the objective evidence should be considered in the determination of nonobviousness. The burden of proof as to this connection or nexus resides with the patentee. See , e.g ., *Cable Electric Products, Inc. v. Genmark, Inc.* , 770 F.2d 1015, 1027, 226 USPQ 881, 888 (Fed.Cir. 1985).

In meeting its burden of proof, the patentee in the first instance bears the burden of coming forward with evidence sufficient to constitute a *prima facie* case of the requisite nexus. See *Texas Dept. of Community Affairs v. Burdine* , 450 U.S. 248, 254 n.7 (1981):

The phrase "prima facie case" . . . may be used by courts to describe the plaintiff's burden of producing enough evidence to permit the trier of fact to infer the fact at issue.

(citing 9 J. Wigmore, *Evidence* §2494 (3d ed. 1940) (hereinafter *Wigmore*)); E.W. Cleary, *McCormick on Evidence* §342 (3rd ed. 1984) (hereinafter *McCormick*)):

The judge, using ordinary reasoning, may determine that fact A might reasonably be inferred from fact B, and therefore that the party has satisfied his burden [of producing evidence], or as sometimes put by the courts, has made out a "prima facie" case. [footnotes omitted]

A *prima facie* case of nexus is generally made out when the patentee shows both that there is commercial success, and that the thing (product or method) that is commercially successful is the invention disclosed and claimed in the patent. When the thing that is commercially successful is not coextensive with the patented invention -- for example, if the patented invention is only a component of a commercially successful machine or process -- the patentee must show *prima facie* a legally sufficient relationship between that which is patented and that which is sold. For example, in *Hughes Tool Co. v. Dresser Industries, Inc.* , 816 F.2d 1549, 1556, 2 USPQ2d 1396, 1402 (Fed.Cir.), cert. denied , 108 S.Ct. 261 (1987), this court reviewed the relation between the patented feature and the thing sold and held that:

Such continuous use of the patented feature while other features were not copied gives rise to an inference that there is a nexus between the patented feature and the commercial success.

See also *Railroad Dynamics, Inc. v. A. Stucki Co.* , 579 F.Supp. 353, 366-67, 218 USPQ 618, 628 (E.D. Pa. 1983):

he testimony as to the advantage of the spaced structure with the biasing spring easily supports the inference that the claimed invention itself was responsible for this [commercial] success.

aff'd , 727 F.2d 1506, 220 USPQ 929 (Fed.Cir.), cert. denied , 469 U.S. 871 [224 USPQ 520] (1984).

[4] When the patentee has presented a prima facie case of nexus, the burden of coming forward with evidence in rebuttal shifts to the challenger, as in any civil litigation. See *Hazelwood School District v. United States*, 433 U.S. 299, 314 (1977) (Stevens, J., dissenting) ("The basic framework [in a title VII action] is the same as that in any other lawsuit. The plaintiff has the burden of proving a prima facie case; if he does so, the burden of rebutting that case shifts to the defendant"); see also *McCormick* §336:

The burden of producing evidence on an issue . . . is usually cast first upon the party who has pleaded the existence of the fact, but as we shall see, the burden may shift to the adversary when the pleader has discharged his initial duty. [footnote omitted]

It is thus the task of the challenger to adduce evidence to show that the commercial suc

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cess was due to extraneous factors other than the patented invention, such as advertising, superior workmanship, etc. As discussed in *Rosemount, Inc. v. Beckman Instruments, Inc.*, 727 F.2d 1540, 1546, 221 USPQ 1, 7 (Fed.Cir. 1984), "argument" and "conjecture" are insufficient:

Beckman's argument that a nexus between commercial success and Cardeiro's invention is lacking and its conjecture that some of the commercial success here proven may have been due to elements in nonasserted claims are inadequate to overcome the objective evidence of record.

Id. Once a prima facie case of nexus is made the court must consider the evidence adduced on both sides of the question, with such weight as is warranted. See *Ashland Oil, Inc. v. Delta Resins & Refractories*, 776 F.2d 281, 306, 227 USPQ 657, 674 (Fed.Cir. 1985) ("The objective evidence of secondary considerations may in any given case be entitled to more or less weight, depending upon its nature and its relationship to the merits of the invention"), cert. denied, 475 U.S. 1017 (1986). When a prima facie case is made and not fully rebutted, the district court may not totally ignore the objective evidence. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1555, 220 USPQ 303, 314 (Fed.Cir. 1983) ("The objective evidence of nonobviousness . . . should when present always be considered as an integral part of the analysis"), cert. denied, 469 U.S. 851 (1984).

This evidentiary routine is reflected in the decisions of this and our predecessor courts, and appears to have been followed in most trial courts. For example, in *Stevenson v. U.S. Int'l Trade Comm'n*, 612 F.2d 546, 204 USPQ 276 (CCPA 1979) the patentee had in the first instance provided affidavit and survey evidence of public preference for the patented skateboard; the patentee was held to have

establish[ed] prima facie a nexus between commercial success and the merit of appellant's invention, the provision of an inclined foot-depressible lever.

Id. at 553, 204 USPQ at 282-83. The burden of coming forward shifted to the challenger, who presented evidence of alternative reasons for the commercial success:

In rebuttal, to show that the commercial success is unrelated to the merits of the invention, appellees presented [a witness] who gave his opinion that the commercial success was due to cosmetic reasons.

Id. The court determined that the appellee had not overcome the prima facie case of nexus, and took the objective evidence into account in its determination of nonobviousness:

We consider the testimony proffered by appellee to be insufficient to overcome the evidentiary value of that of appellants. The net result is a positive inference that the claimed skateboard would have been unobvious at the time the invention was made to one of ordinary skill in the art.

Id. at 554, 204 USPQ at 283.

A patentee is not required to prove as part of its prima facie case that the commercial success of the patented invention is *not* due to factors other than the patented invention. It is sufficient to show that the commercial success was of the patented invention itself. A requirement for proof of the negative of all imaginable contributing factors would be unfairly burdensome, and contrary to the ordinary rules of evidence. See 9 *Wigmore* §2486 at 291 ("Thus, in most actions of *tort* there are many possible justifying circumstances . . . ; but it would be both unfair and contrary to experience to assume that one of them was probably present and to require the plaintiff to disprove the existence of each one of them") (emphasis in original). See also *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1382, 231 USPQ 81, 92 (Fed.Cir. 1986), cert. denied, 107 S.Ct. 1606 (1987), where the court stated that "the record shows that advertising makes those in the industry -- hospitals, doctors, and clinical

laboratories -- aware of the diagnostic kits but does *not* make these potential users buy them; the products have to work, and there is no evidence that that is *not* the case here or that the success was *not* due to the merits of the claimed sandwich assays -- clearly contrary to the district court's finding." (Emphases added.)

In the present case, Demaco admitted that the paving stone was commercially successful. In a letter written before filing suit, Demaco described this stone as "a most important segment of the paver market", and in another letter Demaco stated that "[t]his paver shape is in demand in both Georgia and Florida." It was further undisputed that it was the patented paving stone that was the thing sold in commerce. Demaco adduced no evidence to show that the paving stone's commercial success was due to any factor other than its patented structure. There was no evidence that its success was due, for example, to advertising or other factors unrelated to its technological advantages. By placing the burden on Langsdorff to prove that commercial success was *not* due primarily to advertising or other factors such as technical service to licensees and the licensing of other products, the district court

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put the shoe on the wrong foot.² Demaco did not meet its burden of rebutting the *prima facie* case of nexus between the Langsdorff patented invention and its commercial success, and the district court clearly erred in its contrary finding.

² The court called the Barth paver "only a pedestrian advance".

Viewing all the factors pertinent to determination of obviousness, applying the guidelines of *Graham v. Deere*, leads us to conclude that the presumption of validity had not been overcome by clear and convincing evidence. The holding of invalidity of claims 9, 13 and 29 through 33 for obviousness is reversed.

Inequitable Conduct

The district court held that the Barth patent was unenforceable for inequitable conduct, finding that German patent (Gebrauchsmuster) No. 1,998,249 ("Geb. '249") had been intentionally withheld from the PTO, and that the threshold of materiality had been met.

The concept of inequitable conduct in patent procurement derives from the equitable doctrine of unclean hands: that a person who obtains a patent by intentionally misleading the PTO can not enforce the patent. Inequitable conduct may be held although the common law elements of fraud are absent. To achieve a just application of this penalty in the variety of situations that may arise, this court established a balancing test in *American Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1364, 220 USPQ 763, 774 (Fed.Cir.), cert. denied, 469 U.S. 821 [224 USPQ 520] (1984) whereby the materiality of the information that was not provided to the PTO is weighed against the intent of the actor. The court is charged with reaching an equitable result in view of the particular circumstances of the case.

Geb. '249 was disclosed to the German patent office and cited by the German examiner in connection with the German counterpart of the Barth patent. It shows a nine-sided paving stone having the laying pattern shown:



The shape of Geb. '249 was described by the district court as "interesting in the sense that abnormal geometric forms are interesting." The court held that Geb. '249 satisfied the "but it may have been" test for materiality and should have been disclosed, although the court stated "the Court does not feel Geb. '249 is material when measured against the objective 'but for' test."

On the question of intent, the district court observed that Geb. '249 was a basis for rejection by the German examiner, and concluded that Geb. '249 had intentionally been withheld from the United States PTO. The court found:

The evidence shows that the applicants' German patent counsel intentionally did not provide his American counterpart with Geb. '249 despite the American attorney's inquiry specifically directed to that issue.

The "evidence" appears to consist solely of correspondence between the German attorney and the U.S. attorney, as follows:

On December 3, 1976 the German attorney wrote to the U.S. attorney stating:

At first we would ask you to file the list of all prior art meanwhile become known to the Applicants beyond the citations made by the Examiner in the U.S. procedure.

The prior art listed by the German attorney included nine German references and one Austrian reference, including Geb. '249. Of these ten references, copies of the drawings of seven were enclosed with the letter, including the full text of two references. No copies of the remaining three (including Geb. '249) were sent.

A second letter from the German attorney dated December 10, 1976 listed four additional references cited by the German examiner, and included copies of drawings from these four references.

On December 21, 1976, the U.S. attorney sent a telex to the German attorney with the following message:

Your letter of December 3 came without copies of listed U.M. 1957744, U.M. 1988249 [Geb. '249], and laid-open 1784497. Copies were received of [two other references] not mentioned in the letter. Please clarify.

The German attorney responded on December 22, 1976, as follows:

With our letter of December 3, 1976 we intentionally did not send you the following references U.M. 1,957,744 and U.M. 1,988,249 and 'OS' 1,784,497, from among those mentioned . . . as this was not deemed necessary.

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No further correspondence is of record. The U.S. attorney filed with the U.S. PTO a list of the references of which copies were sent with the December 3 and December 10 letters, along with the copies or drawings received, as required by PTO practice. The three references for which no copies were sent, including Geb. '249, were not listed.

Although the district court attributed culpable intent to the German attorney, this record does not show clear and convincing evidence thereof. The German attorney included Geb. '249 on "the list of all the prior art meanwhile become known to the Applicants". The district court did not discuss whether the U.S. attorney was delinquent, and may have deemed it exculpatory that the U.S. attorney inquired of the German attorney as to why copies of three references were not provided, and received the reply that it "was not deemed necessary". We need not speculate as to how the German attorney may have intended and the U.S. attorney may have interpreted this statement. Our task is to review whether the district court clearly erred in its finding of culpable intent. *See FMC Corp. v. The Manitowoc Co.*, 835 F.2d 1411, 1415, 5 USPQ2d 1112, 1115 (Fed.Cir. 1987) ("To be guilty of inequitable conduct, one must have intended to act inequitably").

Of the three unfiled references on the German attorney's list, only Geb. '249 is at issue. Although the absence of further investigation by the U.S. attorney of the possible relevance of Geb. '249 is a factor to be considered by the court, the court may consider all the surrounding circumstances. We note, for example, that Geb. '249 was listed in the German priority document filed with the PTO: this does not support a conclusion of intentional withholding. Indeed, the record contains no evidence of deliberate concealment.

An applicant who knew or should have known of the art or information, and of its materiality, is not automatically precluded thereby from an effort to convince the fact finder that the failure to disclose was nonetheless not due to an intent to mislead the PTO

Id. at 1416, 5 USPQ2d at 1116.

[5] We conclude that there is not clear and convincing evidence to support the district court's finding of a deliberate intent to conceal Geb. '249. *See id.* at 1415, 5 USPQ2d at 1115 ("one who alleges a 'failure to disclose' form of inequitable conduct must offer clear and convincing proof"). The district court's finding of the intent element of inequitable conduct was therefore clearly erroneous; nor did the evidence of record establish gross negligence of such gravity as to warrant the drawing therefrom of an inference of intent to deceive or mislead the PTO. We conclude that in these circumstances inequitable conduct has not been proved. The district court's judgment of unenforceability is reversed.

Infringement

The ruling of noninfringement flowed from the decision of invalidity and unenforceability, and was not otherwise discussed by the district court. Demaco's counsel told the court:

erhaps I should start by saying there is no question as to infringement. If the patent is held valid and enforceable, all of these parties are infringers . . . we make no bones about it. The patent has been copied. . . . the issue of infringement just simply isn't in this case we've conceded on that point.

On this basis, we reverse the finding of noninfringement, and remand for determination of remedy.

REVERSED AND REMANDED
Concurring Opinion Text

Concurrence By:

Archer, J., concurring.

I join the majority opinion except with respect to the majority's "Inequitable Conduct" analysis.

The German patent (Gebrauchsmuster), No. 1,988,249 (Geb. '249), in my view, fails to meet the threshold of materiality, even though a basis for rejection by the German examiner and by the U.S. examiner in the reexamination of the Barth '357 patent. It is, at best, merely cumulative of prior art disclosed. Geb. '249 discloses an asymmetrical nine-sided paving stone having a single laying pattern, as shown in the majority opinion. The U.S. examiner cited Geb. '249 as showing "slab elements or paving modules being of a single piece of concrete consisting of a head portion and a stem portion." This much was shown by other prior art references which were before the U.S. examiner during prosecution of the Barth '357 patent. In reversing the German examiner's decision, the German Federal Patent Court stated that the

covering element according to [Geb. '249] . . . which also has a head and a stem, is neither symmetrically designed about a longitudinal axis nor about another axis, and already for this very reason it is not suitable for giving suggestions to the person skilled in the art through which the features characterized in the claim and directed to a covering element which is

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symmetrical about a longitudinal axis could have been implied.

Claim 9 claims, *inter alia*, a "centrally symmetrically [sic] octagon" head and the head and stem "being mirror symmetrical about said longitudinal axis." Prior art references before the examiner during both the original examination of the Barth application and the reexamination proceeding disclosed paving stones or comparable elements having integral head and stem portions. Thus, even if the Geb.'249 stone had been symmetrical and of ten sides instead of nine, it would only be cumulative. *Litton Industrial Products, Inc. v. Solid State Systems Corp.*, 755 F.2d 158, 167, 225 USPQ 34, 40 (Fed.Cir. 1985). Consequently, while the shape of Geb. '249 may have been "interesting," as the district court noted, it hardly satisfied the "but it may have been" test for materiality as the district court held. Accordingly, it is unnecessary in my view to reach the intent question of the inequitable conduct inquiry.

- End of Case -

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191 USPQ 90
In re Wertheim, et al.
U.S. Court of Customs and Patent Appeals

No. 75-536

Decided August 26, 1976

541 F2d 257

Headnotes

PATENTS

[1] Applications for patent — Continuing (► 15.3)

Patentability — Anticipation — Carrying date back of references (► 51.203)

Patentability — Anticipation — Patents — In general (► 51.2211)

Specification — Sufficiency of disclosure (► 62.7)

Claims are entitled to filing dates of parent application under 35 U.S.C. 120 and foreign application that was filed less than one year before parent application under 35 U.S.C. 119 if parent and foreign applications comply with 35 U.S.C. 112, first paragraph, including description requirement, as to claims' subject matter.

[2] Foreign patents (► 38.)

Patentability — Anticipation — Carrying date back of references (► 51.203)

Specification — Sufficiency of disclosure (► 62.7)

All 35 U.S.C. 119 requires is that foreign application describe and seek protection for broadly same invention as described in U.S. application claiming its benefit.

[3] Court of Customs and Patent Appeals — Issues determined — In general (► 28.201)

Court of Customs and Patent Appeals — Issues determined — Ex parte patent cases (► 28.203)

Court of Customs and Patent Appeals, in interests of judicial economy, declines entreaty to determine whether decision's broad rule is still valid, since stated issue is dispositive regardless of decision's validity in its own factual setting; court need not separately decide sufficiency of parent U.S. application of applicants who must have benefit of their foreign application, which contains disclosure regarding limitations that is virtually identical to parent application's, to antedate reference patent.

[4] Specification — Sufficiency of disclosure (► 62.7)

Description requirement's function is to ensure that inventor possessed, as of filing date of application relied on, specific subject matter later claimed by him, but how specification accomplishes this is not material; application need not describe claim limitations exactly, but only so clearly that persons of ordinary skill in art will recognize from disclosure that applicants invented processes including those limitations.

[5] Amendments to patent application — In general (► 13.1)

Specification — Sufficiency of disclosure (► 62.7)

Primary consideration, in determining whether application describes claim limitations sufficiently clearly that persons of ordinary skill in art will recognize from disclosure that applicants invented processes including those limitations, is factual and depends on invention's nature and amount of knowledge imparted to those skilled in art by disclosure; broadly articulated rules are particularly inappropriate in this area; mere comparison of ranges is not enough, nor are mechanical rules substitute for analysis of each case on its facts to determine whether application conveys to those skilled in art information that applicants invented claims' subject matter; court must decide whether invention applicants seek to protect by their claims is part of invention they described as theirs in specification; fact that what applicants claim as patentable to them is less than what they describe as their invention is not conclusive if their specification also reasonably describes what they do claim; form would otherwise triumph over substance, substantially eliminating applicant's right to retreat to otherwise patentable species merely because he erroneously thought he was first with genus when he filed; patent law provides for amending claims as well as specification during prosecution, so that 35 U.S.C. 112, second paragraph, "particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention" does not prohibit applicant from changing what he regards as invention, or subject matter on which he seeks patent protection, during application's pendency.

[6] Patentability — Anticipation — Carrying date back of references (► 51.203)**Pleading and practice in Patent Office — Rejections (► 54.7)****Specification — Sufficiency of disclosure (► 62.7)**

As in cases involving section 112 enablement requirement, Patent and Trademark Office has initial burden of presenting evidence or reasons why persons skilled in art would not recognize in disclosure description of invention defined by claims; pointing to fact that claim reads on embodiments outside description's scope satisfies burden, so that applicants whose claim recites solids content range of "at least 35%" and whose foreign application described 25-60% range have burden of showing that 60% upper limit of solids content described is inherent in claim's limitation "at least 35%"; it is immaterial in ex parte prosecution whether same or similar claims were allowed to others.

[7] Interference — Interference in fact (► 41.40)**Specification — Claims as disclosure (► 62.3)****Specification — Sufficiency of disclosure (► 62.7)**

Originally filed claim in appealed application is its own written description; disclosure of patent issued after applicants' foreign application is not evidence of what those skilled in art considered conventional at time foreign application was filed for Section 112 purposes; fact that claim's limitation is not material does not matter when limitation is copied; immateriality excuses only failure to copy patent claim's limitation.

[8] Specification — Sufficiency of disclosure (► 62.7)

There is important practical distinction between broad generic chemical compound inventions in which each compound within genus is separate embodiment of invention, and invention in which range of solids content is but one of several process parameters; broader range does not describe narrower range where broad described range pertains to different invention than narrower and subsumed claimed range.

[9] Patentability — Anticipation — Carrying date back of reference (► 51.203)**Pleading and practice in Patent Office — Rejections (► 54.7)****Specification — Sufficiency of disclosure (► 62.7)**

Fact that applicants' foreign application describes invention as employing solids contents within

25-60% range along with specific embodiments of 36% and 50% warrants conclusion, in context of process for making freeze-dried instant coffee from concentrated coffee, that persons skilled in art would consider claimed process employing 35-60% solids content range to be part of invention; Patent and Trademark Office's mere argument of lack of literal support is not enough; In re Lukach, 169 USPQ 795, statement that invention claimed does not have to be described in *ipsis verbis* in order to satisfy 35 U.S.C. 112 description requirement would be empty verbiage if lack of literal support alone were enough to support 35 U.S.C. 112 rejection; burden of showing that claimed invention is not described in specification rests on Patent and Trademark Office in first instance, and it is up to it to give reasons why description not in *ipsis verbis* is insufficient.

[10] Amendments to patent application — New matter (► 13.5)

Pleading and practice in Patent Office — Rejections (► 54.7)

Specification — Sufficiency of disclosure (► 62.7)

New matter rejection resting on Patent and Trademark Office's conclusion that application as filed did not describe limitation is tantamount to rejection on 35 U.S.C. 112, first paragraph, description requirement.

[11] Patentability — Anticipation — In general (► 51.201)

Patentability — Invention — In general (► 51.501)

Pleading and practice in Patent Office — Rejections (► 54.7)

Disclosure in prior art of any value within claimed range is anticipation of claimed range; fact that rejections are under 35 U.S.C. 103 rather than 102 requires considering whether applicants' invention and patent's disclosure are directed to different purposes and whether persons of ordinary skill in art would not look to reference patent's grandparent application for solution to problem addressed by applicants.

[12] Patentability — Invention — In general (► 51.501)

Applicants may not use rationale, that patent and its grandparent application gave no hint of inventive concept of regulating product bulk density to show unobviousness without antecedent basis for it in their application.

[13] Patentability — Invention — Specific cases — In general (► 51.5091)

It would be obvious to reduce size of coffee foam particles by suitable mechanical means to desired end product size, in process for making freeze-dried instant coffee, before, rather than after drying.

[14] Patentability — Invention — In general (► 51.501)

Applicants whose claim requires freezing over 7 to 25 minute period and who indicate that this produces coffee "having pleasant dark colour" have not overcome *prima facie* case of obviousness made out by reference disclosing instantaneous freezing, absent showing that only their claimed freezing time produces coffee of pleasant dark color.

[15] Patentability — Invention — In general (► 51.501)

Pleading and practice in Patent Office — Rejections (► 54.7)

Specification — Sufficiency of disclosure (► 62.7)

Fact that persons skilled in art may not know how to ensure claimed final product densities from specification is pertinent only to rejection on 35 U.S.C. 112, first paragraph, enablement requirement, and not to whether limitation distinguishes prior art under Section 103.

[16] Patentability — Anticipation — Patent application (► 51.219)

Specification — In general (► 62.1)

Applicants' disclosure may not be used against them as prior art absent admission that matter disclosed in specification is in prior art.

[17] Claims — Article defined by process of manufacture (► 20.15)**Patentability — Invention — In general (► 51.501)**

Court of Customs and Patent Appeals does not subscribe to broad proposition that process limitations can never serve to distinguish apparatus claims' subject matter from prior art.

[18] Patentability — Anticipation — Patents — In general (► 51.2211)

Prior art patents are to be viewed for what they disclose in their entireties and not merely for their inventive contributions to art.

[19] Claims — Article defined by process of manufacture (► 20.15)**Patentability — Invention — In general (► 51.501)****Pleading and practice in Patent Office — Rejections (► 54.7)**

Patentability of products defined by product-by-process claims, and not processes for making them, is what must be gauged in light of prior art; fact that some products covered by applicants' product-by-process claims may not be suggested by reference patent's grandparent application that completely discloses other subject matter embraced by applicants' claims is not relevant to patentability, complete disclosure in prior art being epitome of obviousness; fact that applicants do not contend that they could not understand basis for rejection because of Patent and Trademark Office's failure to give clear reasons for its action under 35 U.S.C. 132 and explanations given by examiner and Board of Appeals were legally ample under section warrants conclusion that claims that were allegedly improperly grouped with other claims were subject of proper rejection.

Particular Patents**Particular patents —Drying Method**

Wertheim and Mishkin, Drying Method, rejection of claims 1, 4, 6-16, 21-28, 30-35, and 40-43 affirmed; rejection of claims 2, 17-20, 29, 37, and 38 reversed; appeal dismissed as to claims 3, 5, 36, and 39.

Case History and Disposition

Appeal from Patent and Trademark Office Board of Appeals.

Application for patent of John H. Wertheim and AbrahamR. Mishkin, Serial No. 96,285, filed Dec. 8, 1970, continuation of application, Serial No. 537,679, filed Mar. 28, 1966, claiming benefit of Swiss application filed Apr. 2, 1965. From decision rejecting claims 1, 2, 4, 6-35, 37, 38, and 40-43, applicants appeal. Modified; Baldwin and Miller, Judges, dissenting in part with opinions.

Attorneys

William H. Vogt III, and Watson Leavenworth Kelton & Taggart, both of New York, N.Y. (Paul E. O'Donnell, Jr., New York, N.Y., of counsel) for appellants.

Joseph F. Nakamura (Gerald H. Bjorge, of counsel) for Commissioner of Patents and Trademarks.

Judge

Before Markey, Chief Judge, and Rich, Baldwin, Lane, and Miller, Associate Judges.

Opinion Text**Opinion By:**

Rich, Judge.

This appeal is from the decision of the Patent and Trademark Office (PTO) Board of Appeals affirming the final rejection of claims 1-43, all the claims in application serial No. 96,285, filed December 8, 1970, entitled "Drying Method."¹ The appeal on claims 3, 5, 36, and 39 has been *withdrawn*, and as to these claims it is, therefore, dismissed. As to the remaining claims, we affirm in part and reverse in part.

¹ A continuation (or continuation-in-part, as the examiner has required it to be denominated) of application serial No. 537,679, filed March 28, 1966. Appellants claim the benefit of a Swiss application filed April 2, 1965. The title of the application on appeal is somewhat inaccurate, as the application contains claims to apparatus for drying and dried instant coffee products as well as to a drying method.

The Invention

Appellants' invention centers around a process for making freeze-dried instant coffee. Claims 1, 6, 30, and 40 are illustrative:

1. An improved process for minimising loss of volatiles during freeze-drying of coffee extract which comprises obtaining coffee extract, concentrating said extract to a higher solids level of at least 35%, foaming said concentrated extract to a substantial overrun by injection of a gas into said extract at at least atmospheric pressure to thereby avoid evaporative cooling due to evaporation of water in said extract during said foaming, freezing said foam to below its eutectic point at at least atmospheric pressure while avoiding evaporative cooling, and freeze-drying said extract at below the eutectic temperature of said extract.
6. Process for preparing a powdered coffee extract, which comprises adding sufficient inert gas to a concentrated aqueous extract of roast coffee containing about 25% to 60% by weight of soluble coffee solids to provide a foam having a density between about 0.4 and 0.8 gm/cc, freezing the foamed extract to a solid mass, grinding the frozen foam to a particle size of at least 0.25 mm and freeze drying the ground frozen foam.
30. An apparatus for carrying out the process defined in claim 6 comprising, in combination, means for foaming, a closed chamber capable of being maintained at a temperature which is substantially below the melting temperature of said frozen foam, and, disposed within said chamber, a movable endless belt, means for moving said belt at a low speed, a spreading device for distributing coffee extract foam on said belt and refrigerating means for cooling at least one surface of said belt with a liquid refrigerant.

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40. A dry coffee powder comprising a freeze-dried particulated foamed extract of roast and ground coffee, the foam before freeze drying having a density between about 0.4 and 0.8 gm/cc.

The remaining claims are reproduced in the Appendix hereto. Appellants assert that their invention produces an instant coffee having a bulk density of 0.2-0.3 gm/cc, which corresponds to that of conventional spray-dried instant coffee.² They allege they discovered that this desired bulk density results from controlling the solids content of the concentrated extract prior to foaming and the density of the foam generated therefrom within the range of their freeze-drying process claims.

² So that consumers may continue to use the same amount of freeze-dried instant coffee per cup as conventional instant coffee without change in the strength of the beverage that they are accustomed to.

Since the claims are somewhat elliptical in setting out the steps of appellants' process, we shall describe it further. An aqueous extract of coffee is prepared by percolating hot water through roasted and ground coffee beans. The extract is concentrated to have a solids content between 25% and 60% and is then charged with gas to produce a foam having a density between 0.4 and 0.8 gm/cc. The foam is frozen and ground into particles, preferably 0.25 to 2.0 mm in size, which are freeze-dried by conventional techniques.

Prosecution History and Rejections

The claims which remain on appeal fall into two broad groups: The "interference" claims, 1, 2, 4, 37, and 38; and the "non-interference" claims, 6-35 and 40-43.

As originally filed, the application contained claims 1-5 copied from Pfluger et al. U. S. Patent No. 3,482,990 (Pfluger patent), issued December 9, 1969, on an application filed February 10, 1969. A letter under Rule 205(a), 37 CFR 1.205(a), requesting an interference with the Pfluger patent accompanied the application. By amendment, appellants transferred claims 6-35 from their 1966 application to the instant application. Claims 36-39, added by amendment, are modified versions of the previously copied claims and were presented for the purpose of providing a basis for phantom counts in an interference with the Pfluger patent under Rule 205(a) and Manual of Patent Examining Procedure § 1101.02. They depend from claim 2.

The patents relied on by the examiner are:

Table set at this point is not available. See table in hard copy or call BNA at 1-800-372-1033.

The Pfluger patent issued on a chain of four applications: serial No. 800,353, filed Feb. 10, 1969, which was a continuation of serial No. 520,347, filed Jan. 13, 1966 (Pfluger 1966), which was a continuation in-part of serial No. 309,410, filed Sept. 17, 1963 (Pfluger 1963), which was a continuation-in-part of serial No. 98,007, filed Mar. 24, 1961. The Pfluger patent discloses a process for making freeze-dried instant coffee which has as its goal minimizing the loss from a foamed extract of volatile aromatics which contribute substantially to the natural flavor of coffee and other foods.

De George describes apparatus and methods for freezing liquid, unfoamed coffee extract prior to drying on continuous belts refrigerated by brine tanks contacting the bottom surfaces of the belts. The claims of De George are directed to processes for facilitating the removal of the frozen sheet of coffee extract from the belt before it is freeze dried.

The British patent discloses a rapid freeze-drying process in which the food product is frozen, milled into small particles which are spread from a hopper in single-particle layers onto plates, and freeze-dried in a vacuum chamber. More details of the disclosure are supplied infra.

Carpenter discloses the cooling of a refrigeration belt by spraying cold brine onto the underside of the belt.

The examiner made multiple rejections which were addressed by the board in eight categories, seven of which are before us for review. Category I covers the "interference" claims, which were rejected on the Pfluger patent, claims 1, 2, and 4 under 35 USC 102 and claims 37 and 38 under § 103. The board agreed with the examiner's position that these claims were not entitled to the benefit of appellants' 1965 Swiss priority date because they were not supported by appellant's parent and Swiss applications. The limitations held to be unsupported were "at least 35% [solids content]" in claim 1, "between 35% and 60% soluble solids" in claims 2 and 4, and "pressure of less than 500 microns" and "final product

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temperature of less than 110°F." in claim 4. For that reason appellants were held to be junior to the Pfluger patent on the basis of Pfluger's 1966 filing date. In light of appellants' refusal to file a Rule 204(c)³ affidavit showing a date of invention prior to Pfluger's 1966 filing date, the examiner and the board held the Pfluger patent to be prior art under § 102(e) against claims 1, 2, 4, 37, and 38 and rejected the claims on that basis.⁴ The board refused to hold that the claims were supported in the parent and Swiss applications, "for interference purposes," under our decision in *In re Waymouth*, 486 F.2d 1058, 179 USPQ 627 (CCPA 1973), mod. on reh., 489 F.2d 1297, 180 USPQ 453 (CCPA 1974). The board stated that appellants' failure to file a Rule 204(c) affidavit precluded any attempt to get into an interference and that Waymouth, which concerned the right to make a claim for interference purposes in the application on appeal, was therefore inapplicable to this case.

³ 37 CFR 1.204(c):

When the effective filing date of an applicant is more than three months subsequent to the effective filing date of the patentee, the applicant, before the interference will be declared, shall file two copies of affidavits or declarations by himself, if possible, and by one or more corroborating witnesses, supported by documentary evidence if available, each setting out a factual description of acts and circumstances performed or observed by the affiant, which collectively would prima facie entitle him to an award of priority with respect to the effective filing date of the patent. This showing must be

accompanied by an explanation of the basis on which he believes that the facts set forth would overcome the effective filing date of the patent.

⁴ The examiner and the board did not rely on Pfluger 1963 because the solids content and foam density ranges of the copied claims were not described in that application. In re Lund, 54 CCPA 1361, 376 F.2d 982, 153 USPQ 625 (1967).

Under Category II, the board *affirmed* the rejection of claims 6-10, 12-15, 17, and 26 under 35 USC 132 for new matter. The board held that these claims, which were added to the instant application by amendment, were not supported in the original disclosure for lack of a description of the claimed size of the ground foam particles, i.e., "at least 0.25 mm."

The Category III rejection was *reversed* by the board.

In Category IV, claims 6-8, 11-20, and 40-43 were rejected under § 103 on the disclosure of Pfluger 1963 ⁵ carried forward to the Pfluger patent, in accordance with In re Lund, *supra*. The board found that the foam density range of 0.4-0.8 gm/cc claimed by appellants (and the 0.6-0.8 gm/cc range in claims 19 and 20) was suggested by Pfluger 1963's disclosure of 0.1-0.5 gm/cc foam density and that Pfluger 1963 teaches the use of foaming gases and concentrating the coffee extract prior to foaming. The board found that the final product densities claimed would be inherent "in view of the same foam overrun density disclosed by Pfluger" and that Pfluger's example I, which discloses breaking the frozen foam strands into 3/4" lengths (i.e., "at least 0.25 mm") before drying, would suggest the size of the ground foam particles claimed by appellants.

⁵ Peebles U. S. patent No. 2,897,084, issued July 28, 1959, was cited against claims 19 and 20 to show that agglomerating fine dried coffee particles into larger grounds was old in the art. Appellants have acknowledged this to be true, so it is not necessary to discuss Peebles further.

Category V added De George to the § 103 rejection of claims 9, 10, 30, and 32-35. The board agreed with the examiner that the temperatures, foam thicknesses, and belt lengths and speeds covered by these claims are disclosed in De George, and that it would be obvious to use De George's moving belt apparatus in the Pfluger process.

In Category VI claims 21-23 and 26-29 were rejected under § 103 on Pfluger in view of the British patent, which was relied on for its teaching of the concentration of coffee extract by freezing to a solids content of 27 to 28%. Pfluger was applied to the claims under the rationale employed in Category IV.

Category VII was the rejection of claims 24 and 25 under § 103 on Pfluger, the British patent, and De George, which was relied on to show "the deposition of a coffee extract on a moving belt prior to grinding and freeze drying." The board otherwise relied on the reasoning in Categories V and VI.

Under Category VIII claim 31 was rejected on Pfluger and De George under § 103 for the reasons of Category V, with reliance on Carpenter to show refrigeration of the belt by spraying refrigerant onto the bottom of the belt instead of using De George's brine tanks.

Opinion

The "Interference" Claims –1, 2, 4, 37, and 38

[1] The dispositive issue under this heading is whether appellants' parent and Swiss applications comply with 35 USC 112, first paragraph, including the description requirement, as to the subject matter of

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these claims. If they do, these claims are entitled to the filing dates of the parent application under 35 USC 120, In re Lukach, 58 CCPA 1233, 442 F.2d 967, 169 USPQ 795 (1971), and the Swiss application under 35 USC 119, Kawai v. Metlesics, 480 F.2d 880, 887-88, 178 USPQ 158, 164 (CCPA 1973). Since the PTO relies only on Pfluger 1966 to provide the effective U.S. filing date of the patent as a reference against these claims under §§ 102(e) and 103, a right of foreign priority in appellants' Swiss application will antedate Pfluger 1966 and remove it as prior art against the claims.

[2] The only defect asserted below in appellant's parent and Swiss application disclosures that

covers all these claims is that the applications do not contain written descriptions of the solids content limitations of the concentrated extract prior to foaming, i.e., "at least 35%" (claim 1) and "between 35% and 60%" (claims 2, 4, 37, and 38).⁶

⁶ The solicitor belatedly asserts that the Swiss application is not "for the same invention" as the parent application, insofar as claims 1, 2, and 4 are concerned; he argues that the expression "same invention" in 35 USC 119 should be given the meaning employed by us in the double patenting cases, e.g., In re Vogel, 57 CCPA 920, 422 F.2d 438, 164 USPQ 619 (1970). As we indicated in In re Ziegler, 52 CCPA 1473, 347 F.2d 642, 146 USPQ 76 (1965), the solicitor's reading is too narrow. All § 119 requires is that the foreign application describe and seek protection for "broadly the same invention" as described in the U.S. application claiming its benefit. 52 CCPA at 1481, 347 F.2d at 649, 146 USPQ at 82. The Swiss application has essentially the same disclosure as appellants' parent application and claims broadly the same invention.

[3] Appellants' parent and Swiss applications contain virtually identical disclosures on this point. Both disclose that the coffee extract initially produced by percolation of water through ground roasted coffee is concentrated prior to foaming by suitable means "until a concentration of 25 to 60% solid matter is reached." Examples in each disclose specific embodiments having solids contents of 36% and 50%.

In our view, it is necessary to decide only whether the Swiss application complies with the description requirement of § 112 with respect to the questioned limitations. There is no question that the *instant* application supports claims 1, 2, and 4, which are original claims in that application. Appellants and the solicitor urge us to decide this case by determining whether the broad rule of In re Waymouth, *supra*, is still valid or must be disapproved. In the interest of judicial economy, we decline this entreaty since the issue of whether the Swiss application contains written descriptions of the disputed limitations of claims 1, 2, 4, 37, and 38, being addressed to strict compliance with § 112, first paragraph, is dispositive regardless of the validity of Waymouth in its own factual setting. The sufficiency of the parent U. S. application need not be separately decided since appellants must have the benefit of their Swiss application date to antedate the Pfluger patent.

[4] The function of the description requirement is to ensure that the inventor had possession, as of the filing date of the application relied on, of the specific subject matter later claimed by him; how the specification accomplishes this is not material. In re Smith, 481 F.2d 910, 178 USPQ 620 (CCPA 1973), and cases cited therein. It is not necessary that the application describe the claim limitations exactly, In re Lukach, *supra*, but only so clearly that persons of ordinary skill in the art will recognize from the disclosure that appellants invented processes including those limitations. In re Smythe, 480 F.2d 1376, 1382, 178 USPQ 279, 284 (CCPA 1973).

[5] The primary consideration is *factual* and depends on the nature of the invention and the amount of knowledge imparted to those skilled in the art by the disclosure. The factual nature of the inquiry was emphasized in In re Ruschig, 54 CCPA 1551, 1558-59, 379 F.2d 990, 995-96, 154 USPQ 118, 123 (1967), which involved the question whether a broad generic disclosure "described" the single chemical compound claimed:

But looking at the problem, as we must, from the standpoint of one with no foreknowledge of the specific compound, it is our considered opinion that the board was correct in saying:

Not having been specifically named or mentioned in any manner, one is left to selection from the myriads of possibilities encompassed by the broad disclosure, with no guide indicating or directing that this particular selection should be made rather than any of the many others which could also be made.

Appellants refer to 35 USC 112 as the presumed basis for this rejection and emphasize language therein about *enabling* one skilled in the art to *make* the invention, arguing therefrom that one skilled in the art would be enabled by the specification to make chlorpropamide. We find the argument unpersuasive for two reasons. First, it presumes some motivation for

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wanting to make the compound in preference to others. While we have no doubt a person so motivated would be enabled by the specification to make it, this is beside the point for the question is not whether he would be so enabled but whether the specification discloses the compound to him, specifically, as something appellants actually invented. We think it does

not. Second, we doubt that the rejection is truly based on section 112, at least on the parts relied on by appellants. If based on section 112, it is on the requirement thereof that "The specification shall contain a written description of the *invention* * * *." [Emphasis ours.] We have a specification which describes appellants' invention. The issue here is in no wise a question of its compliance with section 112, it is a question of fact: *Is the compound of claim 13 described therein?* Does the specification convey clearly to those skilled in the art, to whom it is addressed, in any way, the information that appellants invented that specific compound?

Broadly articulated rules are particularly inappropriate in this area. See, e.g., *In re Smith*, 59 CCPA 1025, 1033, 458 F.2d 1389, 1394, 173 USPQ 679, 683 (1972), in which this court felt obliged to overrule a supposed "rule" of *In re Risse*, 54 CCPA 1495, 1500-01, 378 F.2d 948, 952-53, 154 USPQ 1, 5 (1967). Mere comparison of ranges is not enough, nor are mechanical rules a substitute for an analysis of each case on its facts to determine whether an application conveys to those skilled in the art the information that the applicant invented the subject matter of the claims. In other words, we must decide whether the invention appellants seek to protect by their claims is part of the invention that appellants have described as *theirs* in the specification. That what appellants claim as patentable to them is *less* than what they describe as their invention is not conclusive if their specification also reasonably describes that which they do claim. Inventions are constantly made which turn out not to be patentable, and applicants frequently discover during the course of prosecution that only a part of what they invented and originally claimed is patentable. As we said in a different context in *In re Saunders*, 58 CCPA 1316, 1327, 444 F.2d 599, 607, 170 USPQ 213, 220 (1971):

To rule otherwise would let form triumph over substance, substantially eliminating the right of an applicant to retreat to an otherwise patentable species merely because he erroneously thought he was first with the genus when he filed. Cf. *In re Ruff*, 45 CCPA 1037, 1049, 256 F.2d 590, 597, 118 USPQ 340, 347 (1958). Since the patent law provides for the amendment during prosecution of *claims*, as well as the specification supporting claims, 35 USC 132, it is clear that the reference to "particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention" in the second paragraph of 35 USC 112 does not prohibit the applicant from changing what he "regards as his invention" (i.e., the subject matter on which he seeks patent protection) during the pendency of his application. Cf. *In re Brower*, 58 CCPA 724, [728] 433 F.2d 813, 817, 167 USPQ 684, 687 (1970) (fact that claims in continuation application were directed to subject matter which appellants had not regarded as part of their invention when the parent application was filed held not to prevent the continuation application from receiving benefit of parent's date).

[6] Claims 1 and 4 present little difficulty. Claim 1 recites a solids content range of "at least 35%," which reads literally on embodiments employing solids contents outside the 25-60% range described in the Swiss application. As in cases involving the enablement requirement of § 112, e.g., *In re Armbruster*, 512 F.2d 676, 185 USPQ 152 (CCPA 1975), we are of the opinion that the PTO has the initial burden of presenting evidence or reasons why persons skilled in the art would not recognize in the disclosure a description of the invention defined by the claims. By pointing to the fact that claim 1 reads on embodiments outside the scope of the description, the PTO has satisfied its burden. Appellants thus have the burden of showing that the upper limit of solids content described, i.e., 60%, is inherent in "at least 35%," as that limitation appears in claim 1. Appellants have adduced no evidence to carry this burden as to claim 1, and they argue only that since the Pfluger patent contains claim 1 supported by Pfluger's disclosure with a stated upper limit of 60%, like appellants' Swiss disclosure, refusal to grant appellants claim 1 amounts to an illegal reexamination of claim 1 in Pfluger. However, as we have often repeated, as recently as *In re Giolito*, 530 F.2d 397, 188 USPQ 645 (CCPA 1976), it is immaterial in ex parte prosecution whether the same or similar claims have been allowed to others.

[7] Claim 4 contains the additional limitations, relating to the "final product temperature" and the pressure at which the frozen foam is vacuum freeze-dried, of "less

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than 100°F. and "less than 500 microns." "Final product temperature," it appears, refers to the temperature at which so-called bound water is driven off from the product by heating after the vacuum drying phase has ended. We find no description of final product temperature in appellants' Swiss application. It is not disputed that appellants do not expressly disclose final product temperatures or this secondary drying step. They again appeal, however, to the Pfluger patent disclosure and to an amendment entered in the application on appeal (not objected to as new matter

by the examiner) to show that final product temperatures are conventional in the art and need not be expressly disclosed. The amendment is clearly irrelevant since claim 4, an originally filed claim, is its own written description in the appealed application. *In re Gardner*, 475 F.2d 1389, 177 USPQ 396, rehearing denied, 480 F.2d 879, 178 USPQ 149 (CCPA 1973). The issue is whether the Swiss application describes the claimed final product temperature, not whether the instant application does so. The Pfluger patent disclosure is also unavailable to appellants. The Swiss application was filed before Pfluger issued, which means that for the purposes of § 112 the Pfluger disclosure is not evidence of what those skilled in the art considered conventional at the time the Swiss application was filed. *In re Glass*, 492 F.2d 1228, 181 USPQ 31 (CCPA 1974).⁷

⁷ That the final product temperature limitation is not material, as appellants argue, does not matter when the limitation is copied. Immateriality excuses only *failure to copy* a limitation of a patent claim. See *Brailsford v. Lavet*, 50 CCPA 1367, 318 F.2d 942, 138 USPQ 28 (1963); 37 CFR 1.205(a).

Claims 1 and 4, therefore, are not entitled to the benefit of the filing date of appellants' Swiss application.

[8] Claims 2, 37, and 38, which claim a solids content range of "between 35% and 60%", present a different question. They clearly claim a range *within* the described broad range of 25% to 60% solids; the question is whether, *on the facts*, the PTO has presented sufficient reason to doubt that the broader described range also describes the somewhat narrower claimed range. We note that there is no evidence, and the PTO does not contend otherwise, that there is in fact any distinction, in terms of the operability of appellants' process or of the achieving of any desired result, between the claimed lower limit of solids content and that disclosed in the Swiss application. We see an important practical distinction between broad generic *chemical compound* inventions, for example, as in *In re Ruschig*, *supra*, in which each compound within the genus is a separate embodiment of the invention, and inventions like that at bar, in which the range of solids content is but one of several process parameters. What those skilled in the art would expect from using 34% solids content in the concentrated extract prior to foaming instead of 35% is a different matter from what those skilled in the art would expect from the next adjacent homolog of a compound whose properties are disclosed in the specification. We wish to make it clear that we are not creating a rule applicable to all description requirement cases involving ranges. Where it is clear, for instance, that the broad described range pertains to a different invention than the narrower (and subsumed) claimed range, then the broader range does not describe the narrower range. *In re Baird*, 52 CCPA 1747, 348 F.2d 974, 146 USPQ 579 (1965); *In re Draeger*, 32 CCPA 1217, 150 F.2d 572, 66 USPQ 247 (1945).

[9] In the context of *this* invention, in light of the description of the invention as employing solids contents within the range of 25-60% along with specific embodiments of 36% and 50%, we are of the opinion that, as a factual matter, persons skilled in the art would consider processes employing a 35-60% solids content range to be part of appellants' invention and would be led by the Swiss disclosure so to conclude. Cf. *In re Ruschig*, *supra*. The PTO has done nothing more than to argue lack of literal support, which is not enough. If lack of literal support alone were enough to support a rejection under § 112, then the statement of *In re Lukach*, *supra*, 58 CCPA at 1235, 442 F.2d at 969, 169 USPQ at 796, that "the invention claimed does not have to be described in *ipsis verbis* in order to satisfy the description requirement of § 112," is empty verbiage. The burden of showing that the claimed invention is not described in the specification rests on the PTO in the first instance, and it is up to the PTO to give reasons why a description not in *ipsis verbis* is insufficient.

We conclude, therefore, that claims 2, 37, and 38 are entitled to the benefit of the filing date of appellants' Swiss application.

Since the Pfluger patent is not available as prior art as of its 1966 date under §§ 102(e) and 103 against claims 2, 37, and 38, the rejection of those claims is *reversed*. The rejection of claims 1 and 4 is *affirmed*. Appellants filed no affidavit under Rule 204(c) showing a date of invention for claims 1 and 4 prior

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to Pfluger's 1966 filing date, *In re Gemassmer*, 51 CCPA 726, 319 F.2d 539, 138 USPQ 229 (1963), and have not antedated Pfluger as to those claims under 35 USC 119 and 120.

The New Matter Rejection

[10] The issue to be decided here is whether the limitation appearing in claim 6, carried forward into

the other claims affected by this rejection, that the frozen foam be ground "to a particle size of at least 0.25 mm" before it is dried, was added to the instant application in violation of 35 USC 132. This new matter rejection rests on a finding by the PTO that the application as filed did not describe this limitation. Thus, the converse of what we said in *In re Bowen*, 492 F.2d 859, 864, 181 USPQ 48, 52 (CCPA 1974), is true in this case, namely, that this new matter rejection is tantamount to a rejection of the claims on the description requirement of 35 USC 112, first paragraph. The solicitor agrees with this.

We conclude that the originally filed specification clearly conveys to those of ordinary skill in the art that appellants invented processes in which the frozen foam is ground to a particle size of "at least 0.25 mm," and not, as the PTO asserts, only processes in which the particle sizes are no larger than 2 mm. See *In re Smythe*, *supra*.

The specification states, *inter alia* (emphasis ours):

At the end of the [cooling] belt the extract is removed as a continuous rigid sheet which *may* then be broken up into fragments suitable for grinding. These fragments *may*, *for example*, be ground to a particle size which is *preferably* within the range 0.25 to 2.0 mm.

In a modification of the process, the frozen extract may be freeze-dried in the form of *plates or lumps* which are *subsequently* ground to the desired particle size.

The examples speak of drying frozen ground particles of sizes between 0.1 and 2 mm. While the specification indicates that the 0.25 to 2.0 mm range is preferred, we think it clearly indicates that, as an alternative embodiment of appellants' invention, the foam may be dried in lumps or plates of undisclosed size, which are reduced to the obviously smaller preferred particle size by grinding only *after* being dried. The solicitor argues that the claimed "range" has no upper limit, wherefore it is not disclosed. The clear implication of this disclosed modification is that appellants' specification does describe as their invention processes in which particle size is "at least 0.25 mm," without upper limit, as delineated by the rejected claims. The rejection of claims 6-10, 12-15, 17, and 26 under 35 USC 132 is reversed.

The "Non-Interference" Claims —6-35 and 40-43

In the Examiner's Answer, appellants were granted the benefit of the filing date of their Swiss application for claims 16-25, 27-35, and 40-43. The examiner stated: "Claims 6-15 and 26, except for new matter, would otherwise be supported in the Swiss application." Our reversal of the new matter rejection eliminates the basis for the examiner's refusal to give claims 6-15 and 26 the benefit of appellants' Swiss filing date. Appellants' parent and Swiss applications contain the same disclosures concerning particle size as does the application on appeal, and we shall treat all the claims under this heading as entitled to the right of foreign priority claimed by appellants.

Our analysis of these claims will be broken down by the type of claim involved, i.e., process, apparatus, and product, and not as the board addressed them. In each discussion we will apply as prior art under § 102(e) only those portions of the Pfluger patent disclosure that were carried forward from the Pfluger 1963 application (Pfluger 1963) through the two subsequent applications into the patent, as did the board. *In re Lund*, *supra*.

A. Process Claims 6-14 and 16-29

There are four independent process claims: claims 6, from which claims 7-14, 16, and 17 depend; claim 18; claim 19, from which claim 20 depends; and claim 21, from which claims 22-29 depend.

Pfluger 1963 contains the following disclosure, which, in substance, is carried forward into the patent:

This invention is founded on the discovery that an aqueous aromatic liquid containing solids in suspension and solution may be dried without undergoing loss of aromatic volatiles by a process which comprises foaming the aqueous liquid to a substantial overrun while avoiding evaporation of said aqueous liquid, freezing said foam to below its eutectic point while avoiding evaporation of the aqueous liquid, subliming said aqueous liquid from the frozen foam to reduce the moisture of the foam to at least 10-20%, and further drying the foam to a stable moisture content.

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In many applications such foaming can be considerably increased by concentrating the solution or suspension to a relatively high solids content prior to incorporation of air or other gas such as nitrogen therein by first whipping and then freezing the foam, preferably by

conductive freezing. During the foaming step, it is essential in order to prevent loss of volatiles to avoid any evaporative cooling of the material, i.e., evaporation of water during the foaming step. Also, during the freezing step evaporative cooling should be avoided. Other ways for creating a frozen foam without undergoing evaporative cooling involve the overt introduction to a solution or suspension of dry ice, i.e., solid carbon dioxide in a suitably ground or particulate form, whereby carbon dioxide gas is liberated upon subliming of the "dry ice" to cause foaming of the solution or suspension to occur. Similarly, refrigerated air or nitrogen can be introduced to the solution or suspension to cause freezing thereof incident to foaming the material. The foam preferably has a high overrun whereby the density of the solution or suspension is changed from above 1.0 gm./cc. to between 0.1-0.5 gms/cc.

Example I, the sole disclosed embodiment in which the foam density is given, shows foaming the extract to a density of 0.22 gm/cc.

Claims 19 and 20 recite a foam density of "between about 0.6 and about 0.8 gm/cc," outside the range disclosed by Pfluger 1963. The examiner's position was that Pfluger's disclosure of 0.5 gm/cc as an upper density limit suggests "about 0.6 gm/cc" as the lower limit in the processes of claims 19 and 20 "in the absence of a critical difference between them." We see no such suggestion. By preferring a high foam overrun, i.e., lower rather than higher foam densities, Pfluger 1963 teaches away from employing higher foam densities than its disclosed upper limit of 0.5 gm/cc. Appellants' "about 0.6 gm/cc" lower limit is sufficiently precise to describe foam densities above 0.5 gm/cc and thus outside the range of foam densities that persons of ordinary skill in the art would have been motivated to use by Pfluger 1963's disclosure of a preference for high overrun foams no denser than 0.5 gm/cc. The examiner's comment about the lack of a showing of a critical difference is based on his failure to appreciate that Pfluger 1963 teaches away from increasing foam density. The rejection of claims 19 and 20 under § 103 is reversed.

[11] Claims 6-14, 16, 17, and 21-29 recite foam density ranges of "between about 0.4 and 0.8 gm/cc" and solids contents in the range of "about 25% to 60%." Claims 6-10, 12-14, 17, and 26 recite particle sizes of "at least 0.25 mm," claims 16 and 27 say "about 0.25 to 2 mm," claims 11 and 28 recite particle sizes "approximately equal to that of roast and ground coffee," and claims 21-25 do not mention particle size. Pfluger 1963's disclosed foam density range of 0.1-0.5 gm/cc covers values within the scope of all the above-listed claims; the solids contents disclosed in Pfluger 1963 Examples I (27%) and V (30%) are within the claimed ranges of 25-60%. Pfluger 1963 clearly teaches a process for making instant coffee comprising the steps of preparing and concentrating aqueous coffee extract, foaming the extract then freezing the foam, and drying the frozen foam, in that order. Pfluger 1963 teaches fragmenting the frozen foam into $\frac{3}{4}$ -inch pieces before drying; $\frac{3}{4}$ inch is, of course, "at least 0.25 mm." Of course, the disclosure in the prior art of any value within a claimed range is an anticipation of the claimed range. We appreciate the arguments made in *In re Malagari*, 499 F.2d 1297, 182 USPQ 549 (CCPA 1974), and the discussion in *In re Orfeo*, 58 CCPA 1123, 440 F.2d 439, 169 USPQ 487 (1971), to the effect that ranges which overlap or lie inside ranges disclosed by the prior art may be patentable if the applicant can show criticality in the claimed range by evidence of unexpected results. The rejections here are under § 103, not § 102, which requires us to consider appellants' argument that their invention and Pfluger's disclosure are directed to different purposes and that persons of ordinary skill in the art would not look to Pfluger 1963 for a solution to the problem addressed by appellants. See *In re Orfeo*, *supra*.

[12] Appellants' contentions were thus stated in their main brief:

The Board erred at the threshold in failing to appreciate that neither the Pfluger patent nor the 1963 Pfluger application gives any inkling or hint of the inventive concept underlying the rejected claims. * * * The Pfluger disclosures make no mention of product bulk density and contain no suggestion of altering or regulating that density in any manner. Neither does the reference suggest appellants' step of grinding the foam before freeze drying.

One of ordinary skill in the art reading the 1963 Pfluger disclosure would have no

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inkling of the problem addressed and solved by appellants; and one looking for ways to meet that problem would have no occasion to consider Pfluger or his expedients.

Without an antecedent basis for it in their application, appellants may not use this rationale to show unobviousness. *In re Davies*, 475 F.2d 667, 177 USPQ 381 (CCPA 1973). While appellants do disclose what the bulk density of their product "usually" is, we find no suggestion in appellants' application that their invention is addressed to the regulation of the bulk density of the product,

and the claims make no express reference to such regulation. The only references in appellants' disclosure to this alleged problem and its solution which are apparent to us are (emphasis ours):

After freeze-drying, the coffee extract is obtained in the form of a powder the density of which is *usually* 0.2 to 0.3 gm/cc.

Drying of the concentrated extract should *desirably* be carried out *under controlled conditions* such that the finished product possesses an appropriate *density* and colour. * * *

* * * The conditions of freezing, notably belt speed, freezing temperature, thickness of foam layer as well as the *density of the foam*, are factors which have an important *influence* on the *colour* of the finished product and should therefore be carefully controlled.

The inadequacy of this disclosure is evident. There is no mention of *regulating* the final product density or of controlling solids content. We therefore see no basis for depreciating Pfluger as evidence of the scope and content of the prior art, as well as of the level of ordinary skill in this art, as appellants would have us do. Nor is there any factual basis for concluding that the ranges claimed by appellants are critical in themselves to their alleged inventive contribution.

[13] We find no error in the rejection under § 103 of claims 6-14, 16, and 21-28, which recite no final product density. The only difference between claims 6, 12-14, and 16 and the Pfluger 1963 disclosure upon which appellants rely to show the unobviousness of the subject matter of the claims (and which does not relate to solids content or foam density) is the step of "grinding the frozen foam to a particle size of at least 0.25 mm" *prior* to freeze-drying.⁸ Pfluger 1963, appellants assert, "fragments" the frozen foam prior to drying and "grinds" the foam only after it has been dried. As indicated above, the size of the fragments of frozen foam disclosed by Pfluger 1963 is "at least 0.25 mm." We do not think this difference shows the subject matter to be unobvious. Pfluger 1963 implies that the sizes of foam particles before and after drying are comparable; it would have been obvious to reduce the size of the foam particles by suitable mechanical means, whether it be called fragmenting or grinding, to the desired end product size before rather than after drying. Claim 11 differs only in its recitation of final product particle size, which Pfluger 1963 shows is an obvious matter of choice for those of ordinary skill in the art, who know how large ground roasted coffee bean particles are. The commercial motivation for making the particles this size is obvious. Appellants have not *argued* the patentability separately from claim 6 of claims 9 and 10, which add temperature and foam thickness limitations suggested by Pfluger and De George, as discussed infra in considering claims 24 and 25.

⁸ Appellants do not deny that the features added in claims 7, 12, 13, and 14 are taught in the art, and the record shows them to be known in the prior art.

[14] Claim 8 likewise recites no final product density, but it requires that the freezing of the foam take place over a period of 7 to 25 minutes, which, appellants' application indicates, produces instant coffee "having a pleasant dark colour." Pfluger 1963 discloses freezing in liquid nitrogen or liquid air, which would be instantaneous, or rapid freezing on a belt, and states further, "The foam may be frozen at a high or a more gradual rate *without any apparent difference* in the utility thereof insofar as freeze drying is concerned * * *." (Emphasis ours.) Appellants have not shown that only their claimed freezing time produces coffee with a pleasant dark color. Thus, they have not overcome the *prima facie* case of obviousness made out by Pfluger 1963.

In light of appellants' concession in the amendment in which they added claims 37-39 that freeze concentration was known in the art, the rejection of claims 21-23, and 26-28 under Category VI, *supra*, becomes little more than a rejection on Pfluger 1963 alone. With the exception of freeze concentration, which is disclosed by the British patent, every element of claim 21 is disclosed by Pfluger 1963, as indicated *supra*. Appellants advance no arguments for the patentability of claim 21 different from those

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we have already rejected for claim 6. Claim 22 adds only a recitation of the inert gases used in the foaming step, which were known in the prior art. Claims 26-28 recite the particle sizes of claims 6, 16, and 11, respectively; these particle sizes are not sufficient to show unobviousness for the reasons given *supra*. Claim 23, which was also rejected under Category VI, recites the freezing time of claim 8. It is unpatentable for the same reasons given for claim 8, *supra*.

Claims 24 and 25, to which Pfluger 1963, De George, and the British patent were applied under § 103, call for the temperature and foam limitations already discussed under claims 9 and 10, *supra*. Temperature and foam thickness within the claimed ranges are disclosed by Pfluger 1963 in Example

VI (freezing foam at -30°F . on a belt and subsequently loading foam onto trays to a 1-inch (approx. 25mm) depth for vacuum drying). Appellants do not allege that the ranges of claims 24 and 25 are critical.

[15] Claims 17, 18, and 29, on the other hand, recite the bulk density of the final product made by each process in positive terms. The board dismissed these final product density limitations as being merely recitations of the inherent result of observing the foam density and solids content ranges set forth in these claims. Although we found above that appellants' specification as filed does not disclose regulating product density by controlling the foam density and solids content in the process and that claims which failed to recite controlled product density could not rely on this feature to distinguish over the prior art under § 103, these claims do require such regulation or control, by implication through their express recitation of the density of the final product to be obtained from the processes they delimit. That persons skilled in the art may not know how to ensure the claimed final product densities from the specification is pertinent only to a rejection on the enablement requirement of § 112, first paragraph, which is not before us. The only question here is whether the subject matter of claims 17, 18, and 29, the scope of which is unquestionably clear, is obvious under § 103.

[16] Pfluger 1963 discloses no final product densities and contains no teaching on how to achieve any particular final product density from practicing its process. The inherency of final product density adverted to by the board can be gleaned only from appellants' disclosure, if anywhere, which may not be used against them as prior art absent some admission that matter disclosed in the specification is in the prior art. In re Kuehl, 475 F.2d 658, 177 USPQ 250 (CCPA 1973); cf. In re Nomiya, 509 F.2d 566, 184 USPQ 607 (CCPA 1975). In the absence of disclosure of final product densities or how to achieve any desired density in the prior art applied by the PTO to claims 17, 18, and 29, we cannot say that the subject matter of these claims would have been obvious to persons of ordinary skill in the art.

The rejection of process claims 6-14, 16, and 21-28 is *affirmed*; the rejection of claims 17-20, and 29 is *reversed*.

B. Apparatus Claims 30-35

[17] The preamble of independent claim 30, carried forward into claims 31-35, recites that the apparatus is "for carrying out the process in claim 6." Appellants contend that this preamble gives "life and meaning" to the claims, serving to define the interrelationship of the mechanical elements recited in the body of the claims. This argument appears to be based on *Kropa v. Robie*, 38 CCPA 858, 187 F.2d 150, 88 USPQ 478 (1951), the classic case in this court on the construction of claim preambles. In *Kropa* the court surveyed prior cases and said 38 CCPA at 861, 187 F.2d at 152, 88 USPQ at 480-81:

[I]t appears that the preamble has been denied the effect of a limitation where the claim or count was drawn to a structure and the portion of the claim following the preamble was a self-contained description of the structure not depending for completeness upon the introductory clause * * *. In those cases, the claim or count apart from the introductory clause completely defined the subject matter, and the preamble merely stated a purpose or intended use of that subject matter.

While we do not subscribe to the broad proposition that process limitations can never serve to distinguish the subject matter of apparatus claims from the prior art, we fail to see how the general process parameters of claim 6 require an arrangement of the apparatus means recited in claims 30-35 more specific than that set forth in the body of each claim. In no claim is the preamble relied on to provide an antecedent basis for terms in the body. See *In re Higbee*, 527 F.2d 1405, 188 USPQ 488 (CCPA 1976). The context of each invention is clear without reference to claim 6, unlike the situation in *Kropa*, *supra*, in which the preamble "An abrasive article" was the only portion of the claim defining the relationship of the components recited in the body of the claim; the court said, "The term calls forth a distinct relationship between

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the proportions of grain and resin comprising the article." 38 CCPA at 862, 187 F.2d at 152, 88 USPQ at 481.

[18] Appellants do not argue the patentability of claims 32-35 separately from claim 30 and concede that Carpenter discloses the feature added in claim 31. We find that the teachings of Pfluger and De George (and Carpenter on claim 31) show that the subject matter of claims 30-35 would have been obvious to persons of ordinary skill in the art. These references are to be viewed for what they disclose in their entireties and not merely for their inventive contributions to the art. In *re Ogiue*, 517

F.2d 1382, 1387, 186 USPQ 227, 232 (CCPA 1975).

Pfluger 1963, in a portion carried forward to the patent, discloses the following:

Advantageously, in following the teachings of the present process either in a vacuum freeze drying application or in an atmospheric freeze drying application, the frozen foamy mass may be arranged for either batch or continuous processing in any one of a variety of conventional plant handling applications. Thus, the foamy mass can be readily transferred from one food handling station to another, deposited in trays or continuous belts, superimposed on one another or otherwise conventionally located in the vicinity of the freeze drying influences. In the case of a typical freeze drying operation the foams may be frozen and deposited onto trays stacked one above the other on a suitable heat transfer surface in a vacuum chamber. In the case of an atmospheric freeze drying application the foams can be stacked one upon the other upon a foraminous drying member permitting the circulation of the drying medium, e.g. dry air, helium or nitrogen. Throughout all of such freeze drying applications it is imperative that the temperature of the foamy mass be maintained below the eutectic point of the material while drying to assure that the foam stays in a substantially solid or frozen state as distinguished from a melted or semi-liquid state, dehydration of the mass being achieved by a process of sublimation as distinguished from one of evaporation. Such conditions should be followed at least until the moisture content of the foamy mass has been substantially reduced to a point where it has lost at least a majority of its moisture and preferably is superficially dry to the touch, i.e. in the neighborhood of 10-20% moisture by weight.

Example VI of Pfluger 1963, which is carried forward as Example III of the Pfluger patent, shows heat controlling the vacuum chamber to assure a product temperature below -10°F. (De George teaches that the melting point of a 28% solids content extract is about 27°F., whereas the eutectic temperature is constant regardless of concentration at about -13.5°F.) De George discloses the use of endless belts, low speeds, and refrigerating means, and appellants, while arguing that De George treats the handling of solid slabs of frozen extract on refrigeration belts and not frozen foamed extracts, do not and cannot deny that De George discloses apparatus that persons of ordinary skill in the art would have deemed *suitable* for handling foams in the manner shown by Pfluger. Appellants also contend that neither reference discloses the "spreading device" recited in the claims, Pfluger 1963 showing only the application of $\frac{1}{8}$ diameter ribbons of foam through a nozzle to stationary freeze drying trays. The reference in the portion of Pfluger 1963 quoted supra to the deposition of the foam on the belts is ample suggestion, in our opinion, that some means must be employed to apply the foamy mass to the continuous belts. The term "spreading device" is not defined in any special way by appellants and is broad enough to be the means for applying the foam to the belt suggested by Pfluger. The rejection of claims 30-35 is *affirmed*.

C. Product Claims 15 and 40-43

[19] These claims are cast in product-by-process form. Although appellants argue, successfully we have found, that the Pfluger 1963 disclosure does not suggest the control of bulk density afforded by appellants' process, the patentability of the *products* defined by the claims, rather than the processes for making them, is what we must gauge in light of the prior art. See *In re Bridgeford*, 53 CCPA 1182, 357 F.2d 679, 149 USPQ 55 (1966). Each of these claims defines a freeze-dried instant coffee product made by processes which, appellants have contended with respect to their process claims, produce, by virtue of the foam density and solids content ranges taught by appellants, products having a bulk density comparable to spray-dried instant coffee, i.e., 0.2-0.3 gm/cc as indicated in appellants' specification. The solids content and foam density ranges disclosed by Pfluger 1963 overlap those of appellants, and, it appears, the Pfluger process using solids contents and foam densities overlapping those of appellants will produce instant coffee which is indistinguishable from appellants' products. There is no evidence showing that Pfluger's product prepared, for example, using an extract of 30% solids con

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tent foamed to a density of 0.5 gm/cc differs from appellants' claimed products in any way, certainly not in any unobvious way. See *In re Avery*, 518 F.2d 1228, 1233-34, 186 USPQ 161, 165-66 (CCPA 1975). That *some* of the products covered by appellants' claims may not be disclosed or suggested by Pfluger 1963 is not relevant to patentability, since the claims embrace other subject matter completely disclosed by Pfluger 1963, complete disclosure in the prior art being the epitome of obviousness. *In re Pearson*, 494 F.2d 1399, 181 USPQ 641 (CCPA 1974). The rejection of these product claims under § 103 on Pfluger⁹ is *affirmed*.

⁹ Appellants argue in their reply brief that claims 40-43 "were never the subject of an accurate or proper rejection," because the examiner and the board incorrectly grouped them with other claims. As we have indicated, the rejection of claims 40-43 on Pfluger under § 103 was "proper"; appellants do not contend that they could not understand the basis for the rejection because of failure of the PTO to give clear reasons for its action under 35 USC 132, and we find the explanations given by the examiner and board with respect to claims 40-43 to have been legally ample under § 132. Cf. *In re Gustafson*, 51 CCPA 1358, 331 F.2d 905, 141 USPQ 585 (1964).

Conclusion

The appeal is dismissed as to *withdrawn* claims 3, 5, 36, and 39. The decision of the board is *affirmed* as to claims 1, 4, 6-16, 21-28, 30-35, and 40-43, and is *reversed* as to claims 2, 17-20, 29, 37, and 38.

APPENDIX

2. The process of claim 1 wherein the extract is concentrated to between 35% and 60% soluble solids prior to the foaming step.
3. The process of claim 2 wherein the concentrated extract is foamed to an overrun density of between 0.1 to 0.7 gm/cc.
4. The process of claim 2 wherein the frozen foam is vacuum freeze-dried at a pressure of less than 500 microns and a final product temperature of less than 110°F.
5. The process of claim 3 wherein the frozen foam is vacuum freeze-dried at a pressure of less than 500 microns and a final product temperature of less than 110°C.
7. A process according to claim 6 in which said inert gas is at least one of the following gases, namely carbon dioxide, nitrous oxide and nitrogen
8. A process according to claim 6 in which the foam is frozen during 7 to 25 minutes.
9. A process according to claim 6 in which the foam is frozen on a moving belt which is cooled to a temperature between -12 and -70°C.
10. A process according to claim 6 wherein the foam is spread on the belt at a layer thickness of 10 to 40 mm.
11. A process according to claim 6 in which the frozen foam is ground, before freeze-drying, to a particle size approximately equal to that of roast and ground coffee.
12. A process according to claim 6 in which an aromatic condensate obtained by stripping roast and ground coffee is added to said concentrated extract before it is transformed into a foam.
13. A process according to claim 6 in which, after freeze-drying, the powdered coffee extract is aromatised by incorporation therein of 0.1 to 0.5% by weight of an aromatic condensate obtained by stripping of roast and ground coffee.
14. A process according to claim 13 in which said condensate is incorporated in said powdered extract in admixture with an oily carrier.
15. The coffee extract obtained by the process defined in claim 6.
16. Process according to claim 6 in which the frozen foam is ground to a particle size of about 0.25 to 2.0 mm.
17. Process according to claim 6 in which the freeze dried extract has a density of about 0.2 to 0.3 gm/cc.
18. Process for preparing a soluble coffee extract, which comprises adding inert gas to a concentrated aqueous extract of roast coffee having a solids content of about 25% to about 60% to provide a foam, freezing the foam to a solid mass, reducing the frozen foam to particles having a size of about 0.25 to 2.0 mm and freeze drying the frozen particles, the amount of inert gas added to the aqueous extract being sufficient to provide a freeze dried extract having a density between about 0.2 and 0.3 gm/cc.
19. Process for preparing a powdered coffee extract which comprises adding sufficient inert gas to a concentrated aqueous extract of roast coffee to provide a foam having a density between about 0.6

and about 0.8 gm/cc, freezing the foamed extract to a solid mass, grinding the frozen foam to an average particle size of 0.1 to 0.5 mm, freeze drying the ground particles to provide a finely powdered coffee extract, and agglomerating the finely powdered coffee extract.

20. Process according to claim 19, in which the powdered extract is agglomerated to provide an agglomerate having a density of about 0.2 to 0.3 gm/cc.

21. Process for preparing a powdered coffee extract which comprises increasing the soluble coffee solids content of an aqueous extract of roast ground coffee to about 25% —60% by freeze concentration, separating the concentrated extract from ice crystals, adding an inert gas to the concentrated aqueous extract to provide a foam having a density between about 0.4 and 0.8 gm/cc, freezing the foam to a solid mass and freeze drying the frozen foam.

22. Process according to claim 21 in which the inert gas is selected from the group consisting of carbon dioxide, nitrous oxide and nitrogen.

23. Process according to claim 21 in which the foam is frozen during 7 to 25 minutes.

24. Process according to claim 21 in which the foam is frozen on a moving belt which is cooled to a temperature between —12 and —70°C.

25. Process according to claim 24 wherein the foam is spread on the belt at a layer thickness of 10 to 40 mm.

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26. Process according to claim 21 in which the frozen foam is ground before freeze drying to a particle size of at least 0.25 mm.

27. Process according to claim 26 in which the frozen foam is ground to a particle size of about 0.25 to 2 mm.

28. Process according to claim 21 in which the frozen foam is ground before freeze drying to a particle size approximately equal to that of roast and ground coffee.

29. Process according to claim 21 in which the freeze dried extract has a density of about 0.2 - 0.3 gm/cc.

31. An apparatus according to claim 30 in which the means for cooling the belt includes a plurality of sprinklers disposed to spray the refrigerant onto the underside of the belt.

32. An apparatus according to claim 30 in which the belt comprises two sections each provided with separate cooling means, the first of said sections being cooled to a temperature of —12 to —29°C and the second section to —40 to —70°C.

33. An apparatus according to claim 30 also comprising means for fragmenting and milling the frozen foam.

34. An apparatus according to claim 30 in which the length of said belt is 15 to 25 metres and the driving means is adapted to move said belt at a linear speed of about 0.5 to 1.5 m/min.

35. An apparatus according to claim 30 in which said chamber is adapted to be maintained at a temperature of —25 to —45°C.

36. The process of claim 2 wherein the concentrated extract is foamed to an overrun density of between about 0.1 to 0.8 gm/cc.

37. The process of claim 2 wherein the concentrated [506] extract is foamed to an overrun density of between 0.4 to 0.8 gm/cc.

38. The process of claim 2 wherein the frozen foam is vacuum freeze-dried at a pressure of about 150 to 175 microns.

39. The process of claim 3 wherein the frozen foam is vacuum freeze-dried at a pressure of about 150 to 175 microns.

41. A coffee powder according to claim 40 wherein the extract before freeze drying contains about 25% to 60% by weight of soluble coffee solids.

42. A dry coffee powder having a density of about 0.2 to 0.3 gm/cc and comprising a freeze dried particulated foamed extract of roast and ground coffee, said extract containing before freeze drying up to about 60% by weight of soluble coffee solids.

43. A coffee powder according to claim 42 containing about 0.1% to 0.5% by weight of aromatic condensate obtained by stripping roast and ground coffee.

Concurring/Dissenting Opinion Text

Concurrence/Dissent By:

Baldwin, Judge, concurring in part and dissenting in part.

I agree with Judge Miller's treatment of claims 17-20 and 29. Otherwise, I join the majority opinion.

Concurring/Dissenting Opinion Text

Concurrence/Dissent By:

Miller, Judge, dissenting in part and concurring in part.

I dissent on claim 1. The error of the majority in affirming the rejection stems from a misstatement of the issue. It is not necessary when antedating a reference under 35 USC 102(a) or (e) to establish a prior reduction to practice, constructive or actual, of *all* the subject matter falling within the claims. It is necessary only to establish a reduction to practice of sufficient subject matter to render the claimed invention obvious to one of ordinary skill in the art. In re Spiller, 500 F.2d 1170, 182 USPQ 614 (CCPA 1974). The majority errs, therefore, in seeking a description in appellants' parent and foreign priority applications to support the entire claimed subject matter as though these were the applications in which the claims appear. See In re Ziegler, 52 CCPA 1473, 347 F.2d 642, 146 USPQ 76 (1965). Appellants have clearly shown possession of enough of the invention to antedate Pfluger 1966 by establishing a prior constructive reduction to practice in their parent and foreign applications of specific embodiments disclosing concentrating to 50% and 36% total solids and by a broader disclosure of "25 to 60%."

Although the rejection of claim 1 arises in the context of an attempt to initiate an interference, the rejection is clearly under 35 USC 102(a) or (e) and not under Rule 204(c), 37 CFR 1.204(c). Even if the rejection were under that rule, the substance of the rule's requirement for evidence sufficient to establish a *prima facie* case for a judgment of priority against Pfluger 1966 would be satisfied by the prior constructive reduction to practice of embodiments within claim 1 in appellants' parent and foreign applications. Hunt v. Treppschuh, 523 F.2d 1386, 187 USPQ 426 (CCPA 1975); Fontijn v. Okamoto, 518 F.2d 610, 186 USPQ 97 (CCPA 1975).

The majority cites In re Gemassmer, 51 CCPA 726, 319 F.2d 539, 138 USPQ 229 (1963), to support its decision on claim 1. It suffices to note that Gemassmer was decided more than a decade before In re Spiller, Hunt v. Treppschuh, and Fontijn v. Okamoto, *supra*.

I concur in the decision on claim 4 since appellants' parent and foreign applications are silent regarding final product temperature and a secondary heating step and, therefore, fail even as a constructive reduction to practice of the invention of claim 4.

I concur also in the decision on claims 19 and 20, but I do not find it necessary to hold, as the majority implicitly does, that "about 0.6" gm/cc excludes 0.5 gm/cc disclosed in the reference as the upper limit of merely a *preferred* range. Moreover, it is obvious from the reference that the process would work at a higher density than 0.5,

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although inferior results might be expected. My concurrence rests on the requirement of claims 19 and 20 of a specific sequence of steps not suggested by the prior art, namely: providing a high density of about 0.6 to about 0.8 gm/cc, grinding to a fine particle size prior to freeze drying, freeze drying, and finally agglomerating the fine particles into larger particles. This achieves a "highly coloured product of regular particle size." There is no suggestion in the prior art of deliberately grinding to a fine size and then agglomerating to a larger size.

I dissent on claims 17, 18, and 29, because there is at least a *prima facie* relationship between product and foam densities. The board noted this by stating that "the freeze dried density of the coffee would be inherent in view of the same range of foam overrun density disclosed by Pfluger."

Since the foam densities and other conditions disclosed by Pfluger for the process claimed are approximately the same, appellants should be required either to show that the reference does not achieve the same product densities or to establish criticality. Since they have not done so, I would affirm the rejection of claims 17, 18, and 29.

- End of Case -

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Results for: CASECITE(USPQ 2D 1437) OR CASECITE(USPQ 1005) OR CASECITE(USPQ 2D 1934)
USPQ, 2d Series (1986 - Present) > U.S. Court of Appeals, Federal Circuit > In re Woodruff, 16 USPQ2d 1934 (Fed. Cir. 1990)

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16 USPQ2d 1934

In re Woodruff

U.S. Court of Appeals Federal Circuit

No. 90-1095

Decided November 20, 1990

919 F2d 1575

Headnotes

PATENTS

[1] Patentability/Validity - Obviousness - In general (► 115.0901)

JUDICIAL PRACTICE AND PROCEDURE

Procedure - Judicial review - Standard of review - Patents (► 410.4607.09)

Patent and Trademark Office's obviousness determination is reviewed de novo on appeal, while factual findings are reviewed under clearly erroneous standard.

[2] Patentability/Validity - Obviousness - Relevant prior art - Particular inventions (► 115.0903.03)

Patentability/Validity - Obviousness - Evidence of (► 115.0906)

Claimed method of preserving refrigerated fruits and vegetables is obvious in view of prior art method for preventing deterioration of refrigerated vegetables, even though application discloses new benefit of fungal growth inhibition and slightly different range of carbon monoxide concentrations used in atmosphere in which fruits and vegetables are stored, since benefit of preventing fungal growth is at least generically encompassed within prior art's purpose of preventing deterioration of leafy and head vegetables, and since applicant's test results fail to establish that carbon monoxide concentration range claimed in application achieves unexpected results relative to prior art range and that claimed range is therefore critical to fungal growth inhibition.

Case History and Disposition

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Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Patent application of Richard E. Woodruff, serial no. 741,610 (method for inhibiting fungal growth on fresh fruits and vegetables). From decision of Board of Patent Appeals and Interferences upholding examiner's rejection of claims 27-34, applicant appeals. Affirmed.

Attorneys

Patrick F. Bright, of Bright & Lorig, Los Angeles, Calif., for appellant.

Richard E. Schafer, associate solicitor (Fred E. McKelvey, solicitor, with him on brief), for appellee.

Judge

Before Rich and Plager, circuit judges, and Conti, senior district judge (Northern District of California, sitting by designation).

Opinion Text

Opinion By:

Rich, J.

Woodruff appeals from the September 7, 1989 decision of the Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), Appeal No. 86-2814, affirming the rejection of claims 27-34 in Ser. No. 741,610 as unpatentable under 35 U.S.C. §103. We affirm.

BACKGROUND

Woodruff's patent application is entitled "Method for Inhibiting Fungal Growth on Refrigerated Fresh Fruits and Vegetables." It discloses that the growth of fungi on fresh fruits and vegetables can be greatly reduced by storing the vegetables in a specified *modified* atmosphere. This atmosphere differs from ordinary air primarily in the decrease in the amount of oxygen present and an increase in the amount of carbon monoxide.

Although claims 27-34 are appealed, we need consider only independent claims 27 and 31 since Woodruff does not here argue, nor did he argue to the Board, that the dependent claims are separately patentable. Claim 27 reads:

27. A process for inhibiting the growth of fungi on fresh leafy and head vegetables comprising maintaining said fresh leafy and head vegetables in *modified* gaseous atmosphere including carbon dioxide in an amount from 0 to about 20% by volume, molecular oxygen in an amount of about 1% to about 20% by volume, carbon monoxide in an amount of about 3% to about 25% by volume, with the remainder being substantially all molecular nitrogen, for a time sufficient to inhibit the visible growth of fungi on said fresh leafy and head vegetables, and at a temperature in the range of about 29°F. to about 60°F.

Independent claim 31 differs from claim 27 only in stating the carbon monoxide limitation to be "in an amount of more than 5% to about 25% by volume."

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The sole reference relied upon by the Board in rejecting the appealed claims is U.S. Patent No. 3,453,119 to McGill (McGill patent) which is directed to a method of storing fresh leafy and head vegetables (such as lettuce) in order to "maintain their fresh appearance ... even over extended periods of time." The disclosure indicates that the method retards "deterioration changes on storage including respiratory deterioration changes, bacterial deterioration changes and other enzymatic deterioration changes." Like Woodruff's method, McGill's method consists of storing the vegetables in a *modified* atmosphere and at a lower temperature. The following is a comparison of the atmospheres and temperatures claimed in Woodruff's application and those disclosed in McGill (in approximate percent by volume).

Woodruff Woodruff McGill

Claim 27 Claim 31 Patent

0-20% CO ₂	0-20% CO ₂	0-5% CO ₂
1-20% O ₂	1-20% O ₂	1-10% O ₂
3-25% CO	>5-25% CO	1-5% CO
balance N ₂	balance N ₂	balance N ₂
29-60° F	29-60° F	32-40° F

As can be seen, except for the carbon monoxide concentration, all of the ranges of gas concentrations and temperature set forth in the McGill patent are completely within those recited in claims 27 and 31. With respect to the CO concentration, there is an overlap between the percentages of the McGill patent and claim 27, while the percentages of the McGill patent and claim 31 are roughly contiguous.

Woodruff presented a number of declarations to the PTO in support of his contention that the claims are not rendered obvious by the McGill patent. A declaration by reference-patentee Dr. John N. McGill

states that his patent does not teach that fungi are a problem in leafy and head vegetables. Dr. McGill further states that at the time he was doing the research which formed the basis of the McGill patent, he was concerned only with bacteria control and the prevention of "butt-end discoloration" of lettuce, and made no observations as to the growth or lack of growth of fungi on lettuce. This latter contention is supported by selected pages from Dr. McGill's assistant's laboratory notebook. Dr. McGill's declaration also states that, in his opinion as an expert in the field, "processes that control bacteria and slime in leafy head vegetables do not necessarily control fungi and vice-versa," and that the McGill patent "does not teach or suggest to one of ordinary skill in the relevant art how to control fungi in leafy and head vegetables." Dr. McGill's declaration is corroborated by Dr. John H. Silliker, another expert in the art, and by Mr. James R. Lugg, the president of TransFRESH Corporation.¹

¹ TransFRESH Corp. is the assignee of both Woodruff's application and of the now-expired McGill patent.

Woodruff also presented the declaration of Mr. Laurence D. Bell, another TransFRESH employee. Mr. Bell conducted tests comparing the fungi-inhibiting qualities of processes within the scope of claims 27 and 31 with the commercial embodiment of McGill's method used by TransFRESH. According to this declaration, TransFRESH employs a method of storing fresh vegetables wherein the initial concentration of carbon monoxide is about 4.5%, but is allowed to diminish significantly over the first few days of storage. The declaration shows that for 7 and 14 day test periods, the methods within the scope of claims 27 and 31 were much better at preventing fungal growth than was the commercial embodiment of McGill's method.

In affirming the rejection of claims 27-34 under 35 U.S.C. §103, the Board focussed on the teaching in the McGill patent of "inhibiting deterioration generally," noting that it was well-known in the art that fungi cause deterioration in leafy vegetables such as lettuce. The Board also relied heavily on a statement in the McGill patent that leafy vegetables may be stored in the disclosed *modified* atmosphere "for as much as 14 days without substantial loss in appearance," noting that fungal growth would certainly have an adverse impact on the appearance of leafy vegetables. Finally, the Board considered each of the declarations submitted by Woodruff, but concluded that these were insufficient to overcome the rejection.

[1] At the outset, we note that we review an obviousness determination by the PTO *de novo*, *In re De Blauwe*, 736 F.2d 699, 703, 222 USPQ 191, 195 (Fed.Cir. 1984), while our review of factual findings is under the clearly erroneous standard. *In re Caveney*, 761 F.2d 671, 674, 226 USPQ 1, 3 (Fed.Cir. 1985).

We first look to determine the differences between the claimed invention and the prior

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art. Claims 27 and 31 are process claims comprising the single step of maintaining vegetables in a specified atmosphere for a specified time (a time sufficient to inhibit the visible growth of fungi).

The atmospheres recited in claims 27 and 31 are anticipated by the atmosphere taught in the McGill patent except for the overlapping or adjacent ranges of carbon monoxide concentration. Woodruff argues, with respect to claim 31, that there is not simply an *overlap* in ranges, but a *difference* in ranges, since the McGill patent teaches a maximum CO concentration of 5%, while claim 31 requires a CO concentration of "more than 5%." We agree, however, with the Board that the disclosure in the McGill patent of a carbon monoxide concentration of "about 1-5%" does allow for concentrations slightly above 5%.

The actual time limitation of claims 27 and 31 is also met by McGill's disclosure. Claims 27 and 31 state that the vegetables should be maintained in the *modified* atmosphere "for a time sufficient to inhibit the visible growth of fungi." According to the examples given in Woodruff's specification, the time required to show whether or not there has been an inhibition of fungi on leafy and head vegetables is on the order of 6-19 days. As the Board found, the McGill patent discloses storing the vegetables in the *modified* atmosphere for 14 days "without substantial loss in appearance." Thus, the time taught by the McGill patent for storing vegetables in a *modified* atmosphere is within the range which Woodruff's disclosure indicates is "sufficient to inhibit the visible growth of fungi," or at least demonstrate inhibition.

Woodruff, however, maintains that the above language ("time sufficient to inhibit the visible growth of fungi") is not only a time limitation but is also a *purpose* limitation, i.e., the claim requires that one be intending to inhibit fungal growth when performing the claimed method step. Since, argues Woodruff,

the prior art did not recognize the fungi-inhibiting property of Woodruff's method, the prior art could not render obvious a method having the purpose of inhibiting fungal growth.

[2] Judging from the evidence before us, Woodruff may have been the first to recognize the fungal-inhibiting benefit of the method. On the other hand, we do not agree that what Woodruff has allegedly discovered and claimed can be termed a new *purpose* for performing the claimed method. The generic purpose of the method disclosed in McGill is to prevent the *deterioration* of fresh vegetables, which certainly encompasses the specific benefit disclosed by Woodruff. While the McGill patent refers only to the effectiveness of the method against respiratory, bacterial, and enzymatic deterioration, Woodruff's disclosure that the method is *also* effective against fungi relates to but one other known cause of deterioration.

Therefore, there are two differences between the claimed invention and the prior art: one, the slightly different ranges of carbon monoxide concentration used in the *modified* atmosphere; and two, the newly disclosed *benefit* of inhibiting the growth of fungi. We are of the opinion that these differences do not render the claimed process patentable.

It is a general rule that merely discovering and claiming a new benefit of an *old* process cannot render the process again patentable. *Verdegaal Bros., Inc. v. Union Oil Co. of Calif.*, 814 F.2d 628, 632-33, 2 USPQ2d 1051, 1054 (Fed.Cir.), cert. denied, 484 U.S. 827 (1987); *Bird Provision Co. v. Owens Country Sausage, Inc.*, 568 F.2d 369, 375, 197 USPQ 134, 139 (5th Cir. 1978). While the processes encompassed by the claims are not entirely *old*, the rule is applicable here to the extent that the claims and the prior art overlap.

The cases of *In re Shetty*, 566 F.2d 81, 195 USPQ 753 (CCPA 1977) and *In re Marshall*, 578 F.2d 301, 198 USPQ 344 (CCPA 1978) do not, as urged by Woodruff, compel a contrary result. In both of these cases, the applicant had discovered a completely new use for either an old compound (*Marshall*) or an obvious compound (*Shetty*). In the present case, what Woodruff terms a "new use" (preventing fungal growth) is at least generically encompassed by the prior art purpose of preventing the deterioration of leafy and head vegetables.

Nor can patentability be found in the difference in carbon monoxide ranges recited in the claims. The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. See, e.g., *Gardner v. TEC Sys., Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed.Cir.), cert. denied, 469 U.S. 830 [225 USPQ 232] (1984); *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); *In re Ornitz*, 351 F.2d 1013, 147 USPQ 283 (CCPA 1965); *In re Aller*, 220 F.2d 454, 105 USPQ 233 (CCPA 1955). These cases have consistently held that in such a situation, the applicant must show that the particular range is *critical*, generally by showing that the claimed range achieves unexpected results relative to the prior art range. *Gardner*, 725 F.2d at 1349, 220 USPQ at 786 (obviousness determina

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tion affirmed because dimensional limitations in claims did not specify a device which performed and operated differently from the prior art); *Boesch*, 617 F.2d at 276, 205 USPQ at 219; *Ornitz*, 351 F.2d at 1016-17, 147 USPQ at 286; *Aller*, 220 F.2d at 456, 105 USPQ at 235. Woodruff has made no such showing in the present case. The only test results presented by Woodruff are the results reported by Mr. Bell, comparing Woodruff's claimed invention to the *commercial embodiment* of McGill's method. While Woodruff's invention certainly showed superior fungi-inhibiting effect in these tests, the critical comparison is not with the commercial embodiment of McGill's invention, but with the method taught in his patent. According to Mr. Bell's declaration, the carbon monoxide concentration in the test group representing the commercial embodiment of McGill's invention was allowed to drop to 0% after 4 days. The McGill patent does not teach allowing the concentrations of any of the gases to fall out of the suggested ranges.

CONCLUSION

In the absence of adequate evidence showing that ranges of carbon monoxide concentration recited in claims 27-34 are critical, the Board correctly affirmed the rejection of the claims under 35 U.S.C. §103.

AFFIRMED

- End of Case -

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Results for: CASECITE(USPQ 2D 1437) OR CASECITE(USPQ 1005)
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226 USPQ 1005

In re Corkill

U.S. Court of Appeals Federal Circuit

Nos. 84-1683 and 84-1684

Decided August 27, 1985

771 F2d 1496

Headnotes

PATENTS

[1] Patentability -- Anticipation -- In general (► 51.201)

Board of Appeals did not err by rejecting claims that do not correspond in scope to asserted invention, since claims which include substantial measure of inoperability are fairly rejected under 35 USC 112.

[2] Invention -- Specific cases -- Chemical (► 51.5093)

Board of Appeals erred by rejecting claims for obviousness, absent prior art reference suggesting that combination of prior art components would produce greater than additive effect in detergent compound's cleaning performance.

Particular Patents

Particular patents -- Detergent Compositions

Corkill, Madison, and Burns, Detergent Compositions, rejection of claims 2-11, 13-28, 35-42, 49-58, 60-62, 64-74, and 77-79 (Serial No. 450,266) and of claims 1, 3-11, 16, 18, 19, and 21-28, (Serial No. 036,615) affirmed in part and reversed in part.

Case History and Disposition

Appeal from Patent and Trademark Office Board of Appeals.

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Application for patents of John M. Corkill, Bryan L. Madison, and Michael E. Burns, Serial Nos. 450,266, and 036,615. From decision sustaining examiner's rejection of claims 2-11, 13-28, 35-42, 49-58, 60-62, 64-74, and 77-79, of Serial No. 450,266 and of claims 1, 3-11, 16, 18, 19, and 21-28, of Serial No. 036,615, applicants appeal. Affirmed in part and reversed in part.

Attorneys

Thomas H. O'Flaherty, Cincinnati, Ohio (Robert B. Aylor, Cincinnati, Ohio, on the brief) for appellants.

Harris A. Pitlick, Associate Solicitor (Joseph F. Nakamura, Solicitor, and John W. Dewhirst, Associate Solicitor, on the brief) for Patent Office.

Judge

Before Smith, Newman, and Bissell, Circuit Judges.

Opinion Text

Opinion By:

Newman, Circuit Judge.

These consolidated appeals are from the decisions of the Patent and Trademark Office (PTO) Board of Appeals (the Board) sustaining the examiner's rejection of claims 2-11, 13-28, 35-42, 49-58, 60-62,

64-74, and 77-79 in patent application Serial No. 450,266 as unpatentable for obviousness under 35 U.S.C. §103 and the rejection of claims 1, 3-11, 16, 18, 19 and 21-28 in Serial No. 036,615 as unpatentable under 35 U.S.C. §§103 and 112. Serial No. 036,615 is a continuation of Serial No. 450,266, and differs only in the claimed particle size ranges. Both are the invention of John M. Corkill, Bryan L. Madison, and Michael E. Burns (hereinafter collectively Corkill) and are entitled "Detergent Compositions". We affirm in part and reverse in part.

OPINION

In both the '266 and '615 patent applications, Corkill claims the combination of certain zeolites with known detergents, to produce detergent compositions. Some of Corkill's claims require as an additional component "an auxiliary detergent builder salt".

The Board in a first set of appeals *affirmed* the rejections of the claims of both applications under section 103 but, except as discussed for the '615 application, *reversed* the rejections under section 112. Further prosecution ensued, and in a second appeal the Board *affirmed* the rejections of all claims. The principal references relied on by the Board were U.S. Patent 3,661,789 to Corey *et al.* and U.S. Patent 2,882,243 to Milton, although a large number of additional references were cited during the course of an extended prosecution.

The §103 Rejection

We consider first the section 103 rejections as applied to those claims of both applications that are not restricted to the presence of an "auxiliary builder" in the composition. Claim 79 of the '266 application is typical:

79. A detergent composition capable of rapidly reducing the free polyvalent metal ion content of an aqueous solution, comprising:

(a) from about 5% to about 95% by weight of a water-insoluble crystalline aluminosilicate ion exchange material of the formula

Graphic material consisting of a chemical formula or diagram set at this point is not available. See text in hard copy or call BNA at 1-800-372-1033.

wherein z and y are integers of at least 6; the molar ratio of z to y is in the range from 1.0 to about 0.5, and x is an integer from about 15 to 264; said aluminosilicate ion exchange material having a particle size diameter from about 0.1 micron to about 10 microns; a calcium ion exchange capacity on an anhydrous basis of at least about 200 milligrams equivalent of CaCO₃ hardness/gram; and a calcium ion exchange rate on an anhydrous basis of at least about 2 grains/gallon/minute gram; and

(b) from about 5% to about 95% by weight of a water-soluble organic surface-active agent selected from the group consisting of anionic, nonionic, ampholytic and zwitterionic surface-active agents and mixtures thereof.

The core of the board's decision is that it would have been obvious to use known hydrated zeolites with known detergents to reduce water hardness, in view of Corey's teaching of the use of hydrated zeolites with known detergents and bleach to reduce water hardness, and Milton's teaching of zeolites having the same composition and properties as the zeolites in Corkill's claims. Other references were also relied on, but we agree with the PTO that a *prima facie* case is made by the teachings and suggestions of these two references.

The Corey patent contains the following text:

[T]he detergents can be used in combination with the water-soluble soaps and water conditioners. The term "water conditioner" . . . designates those compounds which sequester, or inactive water hardness and aid in cleaning. . . Illustrative of the inorganic water conditioners useful in the

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present invention are the zeolites (hydrated silicates of aluminum and either sodium or calcium or both), sodium carbonate, sodium phosphate, sodium acid phosphate, tetrasodium pyrophosphate, sodium tripolyphosphate, trisodium phosphate, sodium metaphosphate, sodium hexametaphosphate, and sodium tetraphosphate. While the sodium salts of the inorganic compounds are preferred, the other alkali metal salts such as the potassium and lithium salts may be used. (column 4, lines 32-57)

Corkill criticizes the Corey disclosure as "filler", and charges that Corey copied this disclosure from the text of some other patent. Corkill also asserts that Corey does not show that zeolites inactivate water hardness at a rate sufficiently rapid to enable zeolites to be used as replacements for phosphates in detergent compositions. Corkill argues that Corey "merely acknowledges the known art that suggested natural zeolites such as clays . . . or, possibly, amorphous (non-crystalline) zeolites as detergent builders or extenders", and that Corey contains no suggestion to use synthetic crystalline zeolites. Corkill also argues that Corey's reference to calcium zeolites, necessarily inoperative to absorb calcium, shows the inadequacy of Corey as a reliable reference.

The PTO discounts the "filler" argument, correctly in our view, for Corey's plain teaching of zeolites as sequestering agents in detergent compositions exists, whether or not Corey viewed it as "filler". The Solicitor states that the reference to calcium is an obvious mistake, an issue we need not reach, for the Solicitor correctly observes that Corey states that the sodium salts are preferred, and the sodium salts are the subject of Corkill's claims.

The PTO admits, as it must, that Corey does not state whether his hydrated zeolites are naturally occurring or synthetic, but the PTO takes issue with Corkill's argument that Corey necessarily excluded the synthetic zeolites, observing that synthetic zeolites were well known -- *viz.* those disclosed in Milton ten years prior to Corey's filing date. Corkill, bearing the burden of coming forward, did not have persuasive support for his argument that Corey must be limited to the naturally occurring zeolites. We must agree with the PTO that Corey's plain teaching is not limited to natural zeolites.

The PTO completed the foundation of its *prima facie* case with the Milton reference, which shows hydrated and dehydrated zeolite A. The PTO points out that the claimed limitations to Corkill's zeolites relating to hydration, particle size, and sequestering action, are all properties of Milton's zeolites.

Corkill argues that Milton did not recognize that sufficiently rapid sequestration could be obtained. The Milton data show hydrated sodium zeolite A (a zeolite preferred by Corkill) exchanging calcium ions over a period of several days, but Milton also states:

The rate of exchange of sodium zeolite A can under some conditions be quite rapid. For instance, when sodium zeolite A was put into a solution 0.1 molar in calcium ions, 47% of the sodium ions were replaced in a two minute contact time at 25°C and in 7 1/2 minutes the exchange was 59% complete. Under these conditions of solution concentration about 60% was the maximum exchange available. (column 8, lines 8-15)

The Solicitor also points to the table at the bottom of column 2 of Milton, as showing replacement of 93% of sodium by calcium in hydrated sodium zeolite A. Although Corkill criticizes these data as derived from solutions more concentrated than are found in laundry use, this does not mean that the teaching can be ignored. Further, Corkill's "recitation, in a claim to a composition, of a particular property said to be possessed by the recited composition, be that property newly-discovered or not, does not necessarily change the scope of the subject matter otherwise defined by that claim". *In re Wilder*, 429 F.2d 447, 450, 166 USPQ 545, 548 (CCPA 1970).

With respect to the hydration of the zeolites, the Solicitor observed that Corey teaches the use of hydrated zeolites as sequestering agents in detergent compositions, that Milton shows hydrated zeolite A, and that appellant had not shown any criticality in the degree of hydration. Claim 79 spans a range of 15 to 264 molecules of water of hydration when z and y are at least 6, a range commensurate with Milton's disclosure. In response, appellant submitted evidence, by the Madison declaration, that a hydrated zeolite that has been dried and rehydrated is less effective as a detergent builder than one which has not gone through this process. Granting that this has been shown -- the PTO has challenged the significance of the data -- this is not Corkill's claimed invention. Corey teaches that hydrated zeolites are sequestering agents, and Madison does not negate this point.

Corkill argues that the prior art does not teach the importance of particle size in detergent applications, to which the PTO responds that Milton's zeolites are disclosed in precisely appellant's particle size range:

Most of the crystals have a size in the range 0.1 micron to 10 microns, but smaller and larger crystals can occur covering the size range of 0.01 micron to 100 microns. (column 4, lines 63-66)

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and that Corkill has merely used Milton's zeolites in Corey's compositions for the purpose taught by Corey. The Board discounted Corkill's attempted showing that Milton's zeolites are

not produced in the size ranges described in Milton; the Cilley declaration states that the particle sizes of Milton's zeolites are "greatly in excess" of Corkill's upper limit, which is the same upper limit described by Milton. If the purpose of Cilley was to show that Milton's data on the particle sizes of zeolite A are in error, then the PTO correctly found this showing not persuasive. Nor does Cilley's declaration square with appellant's assertion that zeolite A is a preferred species.

Corkill submitted evidence and argument on the criticality of the claimed size range in detergent applications. Wiers and Cilley submitted declarations to show that small particles are needed, but that larger stable agglomerates of up to 100 microns, consisting of small particles of up to 10 microns or so, are effective and can be used in those applications where particle deposit is not a factor.

Corkhill points out that a minimum particle size of one micron is preferred to facilitate secondary sewage treatment techniques, referring to the declaration by Schon, and asks us on this basis to consider separately claims 11, 13-28, 37-39, 42, 60, 74, 77, and 78 of the '266 application, and claims 11 and 16-28 of the '615 application. The Solicitor argues that the Schon affidavit merely shows that particles of less than one micron settle more slowly than larger particles. This particle size preference for sewage treatment purposes is not asserted to have been discovered by Corkill; it does not overcome Milton's teaching of these particle size ranges.

The PTO referred to Milton to show that the properties Corkill asserts to be critical are the properties of known zeolites: the degree of hydration, the particle size, and the rate of calcium absorption. To summarize the PTO's *prima facie* case, which we hold was adequately supported: Corey teaches detergent compositions that may contain hydrated zeolites, or carbonate, or phosphates, to "aid in cleaning." Milton teaches zeolite A in hydrated and dehydrated form, shows the same particle sizes claimed by Corkill, and states that the rate of calcium absorption can be rapid. The PTO concluded that it would have been *prima facie* obvious to use Milton's hydrated zeolites for the hydrated zeolites taught by Corey.

The burden is on appellant to come forward with probative evidence of the unobviousness of the invention as a whole. In attempting to meet this burden, appellant submitted the declaration of Rees to the effect that "it was generally believed" that zeolites worked too slowly and had too low a capacity to be effective in practical use. Opinions of the contemporaneous beliefs of those skilled in the field as to the nonobviousness of an invention merit fair weight. *In re Piasecki*, 745 F.2d 1468, 1473-75, 223 USPQ 785, 789-90 (Fed.Cir. 1984).

Appellant argues that the inventors selected the zeolites of the claims from among "thousands" of compounds, in the search for sequestering agents that could effectively replace phosphates in detergent compositions. Corkill advises that "[t]here are many zeolites other than zeolite A. Note the teaching of record that there are over 35 different types of zeolite framework structures and an infinite number of zeolites are possible." The record does not show, however, whether all or any of these zeolites would work in Corey's detergent compositions. Although Uytterhoeven declared that it cannot be predicted how any candidate will work in a detergent composition, but that it must be tested, this does not overcome Corey's teaching that hydrated zeolites will work.

We have admonished against weighing each piece of rebuttal evidence piecemeal against the solid mass of a *prima facie* case. *Id.* at 1472-73, 223 USPQ at 788. We have thus considered the totality of appellant's evidence. We are mindful of the "hindsight syndrome wherein that which only the inventor taught is used against its teacher." *W. L. Gore & Assoc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 USPQ 303, 312 (Fed.Cir. 1983), cert. denied, 105 S.Ct. 172 (1984).

Appellant's submissions did not persuade the Board that Corkill's claims met the requirements of section 103. Upon review of all the evidence and argument on both sides of the issue, we affirm the correctness of this determination. The rejection under section 103 of the '266 claims that relate to zeolite-containing detergent compositions that are not restricted to requiring the presence of an auxiliary builder, is affirmed.¹

¹ Appellant asks us to consider separately the claims limited to zeolite A. The Board did not do so, nor does the record show how these claims are particularly distinguished from the prior art of record. We do not conduct such an examination *ab initio*.

The '615 Application

The only difference between the '615 and the '266 claims is the upper limit of 100 microns rather than

100 microns as the particle size of the zeolite. Although appellant's

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brief states that particles larger than 10 microns are intended for non-laundry applications, the claims of '615 are not so limited, and no patentable distinction has been *argued* for the larger particles. Milton teaches the particle size ranges of the '615 as well as the '266 claims. There being no other distinction between these claims, we affirm that the claims of the '615 application that relate to zeolite-containing detergent compositions that are not restricted to requiring the presence of an auxiliary builder would have been obvious under section 103.

The §112 Rejection

The PTO also rejected the '615 claims for being indefinite under 35 U.S.C. §112, second paragraph. The Board agreed with the examiner's position that it was not clear whether the particle sizes in the '615 claims referred to single zeolite crystals or to agglomerates comprised of smaller crystals. The Board observed that certain declarants on behalf of Corkill had stated that using particles larger than 10 microns led to unacceptable deposition on clothing and washing machine surfaces, while the Wiers declaration stated that agglomerates up to 100 microns in diameter would perform acceptably for some applications provided that the constituent crystals were sufficiently small.

Wiers also declared that crystals large than 10 microns would not meet the calcium exchange rate of the claims, and thus would *ipso facto* be excluded. Corkill argues that simple experimentation would show which particles do not achieve the desired exchange rate and should not be used: that is, only those particles that worked would be covered by the claims. The PTO argues, *inter alia*, that even if particles larger than 10 microns met the rate limitation they would be unsatisfactory for Corkill's purpose because they would form unacceptable deposits.

[1] Overall, the evidence submitted by Corkill supports the Solicitor's statement that Corkill's "claims do not correspond in scope to what they regard as their invention." Claims which include a substantial measure of inoperatives, as evidenced by the Gedge, Benson, and Ohren declarations, are fairly rejected under 35 U.S.C. §112. *In re Cook*, 439 F.2d 730, 735, 169 USPQ 298, 302 (CCPA 1971); see *Atlas Powder Co. v. E.I. DuPont DeNemours & Co.*, 750 F.2d 1569, 1576-77, 224 USPQ 409, 414 (Fed.Cir. 1984). As footnoted in *In re Cook*, "during the prosecution of patent applications * * * an applicant is still in a position to amend his claims to exclude inoperative subject matter". *In re Cook*, 439 F.2d at 734 n.3, 169 USPQ at 302 n.3; see 439 F.2d at 734 n.4, 169 USPQ at 302 n.4. The rejection under section 112 is affirmed.

Combinations with other "Builders"

The Board considered separately those claims in which the zeolites are combined with other "builders". At issue in Serial No. 450,266 are claims 5, 21, 27, 65, 74, and claims dependent thereon; and in Serial No. 036,615 are Claims 5, 21, 27 and claims dependent thereon.

The Wiers II declaration shows greater than additive cleaning performance resulting from the combination of zeolites with a variety of auxiliary builders, in the face of diminished (less than additive) depletion of calcium ions for the combinations. The Board agreed that results for some of the combinations tested for cleaning performance are "better than would be expected." Appellant points to evidence of better than additive cleaning performance of mixtures of zeolites with each of tripolyphosphate, pyrophosphate, citrate, nitrilotriacetate, carboxymethyl tartronate, and sodium silicate. A greater than expected result is an evidentiary factor pertinent to the legal conclusion of the obviousness *vel non* of the claims at issue. *United States v. Adams*, 383 U.S. 39, 51-52 (1966).

The Board reviewed the evidence contained in the Wiers II declaration and concluded that the evidence demonstrated synergism "to some degree" with respect to cleaning performance, but observed that appellant's claims were not limited to those specific co-builders and detergent compositions for which data showing synergism had been submitted. The Board also held that this result, even if unexpected, was not "sufficient to overcome the *prima facie* case of obviousness established by the prior art."

We discern no *prima facie* teaching of the prior art with respect to these combinations of components. The PTO has pointed to no reference that suggests combining a known builder with zeolites, or that this combination would produce a greater than additive effect in cleaning performance. The PTO has failed to establish a *prima facie* case of obviousness with respect to those claims that require the presence of an auxiliary builder. See *In re Rinehart*, 531 F.2d 1048, 1051-53, 189 USPQ 143, 147-48 (CCPA 1976) (discussing role of PTO's *prima facie* case) and cases cited therein.

The Board has observed that the combination of zeolite and co-builder was not, in most instances reported in the Wiers II declaration,

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superior in cleaning performance to the auxiliary builder alone. This is not the test. In view of the evidence of a result greater than additive, evidencing some unobvious result in the combination of components, whether one component is in itself more active than the other is not controlling.

[2] Corkill's specification teaches that a broad range of surfactants may be used in combination with zeolites plus auxiliary builders. In the absence of prior art suggesting or otherwise making these compositions obvious to one of ordinary skill in the art, there is inadequate support for the PTO's rejection of these claims. The burden on this point has not shifted to Corkill. *In re Warner*, 397 F.2d 1011, 1016, 154 USPQ 173, 177 (CCPA 1967), cert. denied, 389 U.S. 1057 (1968).

We reverse the rejection under 35 U.S.C. §103 of those claims directed to combinations of the zeolites with auxiliary builders: in Serial No. 450,266 claims, 5, 21, 27, 65, 74, and claims dependent thereon; in Serial No. 036,615 claims 5, 21, 27, and claims dependent thereon.

AFFIRMED IN PART and REVERSED IN PART

- End of Case -

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Results for: CASECITE(USPQ 2D 1437)
USPQ, 2d Series (1986 - Present) > U.S. Court of Appeals, Federal Circuit > In re Chupp, 2 USPQ2d 1437 (Fed. Cir. 1987)

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2 USPQ2d 1437
In re Chupp
U.S. Court of Appeals Federal Circuit

No.86-1631

Decided April 15, 1987

816 F2d 643

Headnotes

PATENTS

[1] Patentability/Validity -- Obviousness -- Evidence of (► 115.0903)

Patent and Trademark Office Board of Patent Appeals and Interferences improperly rejected claimed herbicidal compound for obviousness under 35 USC 103, since there is no set number of crops on which compound's superiority must be shown, and since compound's superior activity on quackgrass and yellow nutsedge in corn and soybeans is sufficient to rebut *prima facie* case of obviousness.

Case History and Disposition

Appeal from the Patent and Trademark Office, Board of Patent Appeals and Interferences.

Application for patent, Serial No. 358,967, by John P. Chupp. From decision affirming examiner's final rejection of claims 1 and 12, applicant appeals. Reversed.

Attorneys

Dale H. Hoscheit, and Banner, Birch, McKie & Beckett, both of Washington, D.C. (William I. Andress, St. Louis, Mo., on the brief) for appellant.

Richard E. Schafer, associate solicitor, Office of the Solicitor (Joseph F. Nakamura, solicitor, and Fred E. McKelvey, deputy solicitor, on the brief) for Patent and Trademark Office.

Judge

Before Markey, Chief Judge, Friedman, Circuit Judge, and Re, Chief Judge (U.S. Court of International Trade, sitting by designation).

Opinion Text

Opinion By:

Markey, Chief Judge.

Appeal from a decision of the United States Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (board), affirming the examiner's final rejection of claims 1 and 12 in application Serial No. 358,967 under 35 U.S.C. §103. We reverse.

BACKGROUND

On March 17, 1982, John P. Chupp (Chupp) filed a continuation-in-part application, assigned to Monsanto Company, entitled "Herbicidal 2-Haloacetanilides." The application contained 41 claims to a variety of chemical compounds within the generic class of 2-haloacetanilides, a method for using the compounds to combat weeds in crops, and an herbicidal composition containing a 2-haloacetanilide.

The examiner rejected all claims under 35 U.S.C. §§102(a) and 103, stating that the references, including Swiss patents 579,348 (issued July 31, 1976) and 585,191 (issued January 15, 1977) (Swiss patents), rendered the claimed compounds, methods and compositions *prima facie* obvious.

Chupp canceled all but eleven claims and limited the remaining claims to a single compound, N-(ethoxy methyl)-2'-trifluoromethyl-6'-methyl-2-chloroacetanilide. That compound differs by a single

methylene group (-CH₂-) from the closest prior art compound, N-(ethoxy ethyl)-2'-trifluoromethyl-6'-methyl-2-chloroacetanilide, disclosed in the Swiss patents. Chupp apparently did not challenge the examiner's conclusion that the Swiss patents rendered the claimed compound *prima facie* obvious.

To rebut the *prima facie* case of obviousness, Chupp submitted a declaration discussing the results of tests comparing the herbicidal activity of the claimed compound with that of the closest prior art compounds and with two commercial herbicides. The tests compared the compounds' ability to control two weeds, quackgrass and yellow nutsedge, in two crops, corn and soybeans. It is undisputed that the claimed compound gave superior results, exhibiting selectivity factors (crop safety combined with weed-killing activity) at least five times greater than those of the closest prior art compounds. The declarant concluded "the herbicidal properties of the compound of the invention herein are unquestionably outstandingly superior to those of the relevant prior art; the unexpected and unpredictable magnitude of superiority is evidenced by the many-fold increase in unit activity against weeds and high crop safety."

The examiner finally rejected all claims under 35 U.S.C. §103 as being unpatentable over the Swiss patents, saying that comparative testing using only two weeds and two crops was insufficient to establish unexpected herbicidal activity.

Chupp submitted two more declarations. The first presented data from a second comparative test of the claimed compound and the closest prior art compounds, again comparing their ability to control quackgrass and yellow nutsedge in corn and soybeans. The second declaration, from Dr. F. W. Slife, a University of Illinois agronomy professor, analyzed the results of both comparative tests and praised "the superior performance of the invention compound vis-a-vis the prior art compounds as completely unexpected considering the close chemical structure of the test compounds."

The examiner allowed claims 36 and 37 for a method of combatting weeds in corn and soybeans using the claimed compound, but continued to reject the remaining claims. The examiner said that more extensive comparative testing was needed because the data disclosed in the specification showed the claimed compound would not be superior to prior art compounds for crops other than corn and soybeans.

Chupp appealed the rejection to the board, canceling all remaining rejected claims except 1 and 12. Claim 1 sets forth the compound and its structure. Claim 12 sets forth an "[h]erbicidal composition comprising an adjuvant and a herbicidally effective amount of the compound" and the compound's structure.

The board *affirmed* the rejection of claims 1 and 12, holding that Chupp's evidence was

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insufficient to rebut the *prima facie* case of obviousness. The board said the claimed compound had no new selective herbicides, so it was no surprise that the claimed compound was also a selective herbicide. * Prior art herbicides were useful in many crops; the specification data showed that the claimed compound was at best a run-of-the-mill performer in crops other than corn and soybeans. The board held that because the claims were limited to no particular weed or crop, "the showing is not fairly representative of that which is encompassed by the claims." Therefore, concluded the board, the evidence of superiority in corn and soybeans could not rebut the *prima facie* obviousness of the "invention as a whole".

* An herbicide is "selective" if it controls weeds without injuring the crop.

The board further stated that Swiss patent 579,348 taught that N-alkoxy methyl chloroacetanilides (like the claimed compound) were superior in activity to the corresponding N-alkoxy ethyl chloroacetanilides (like the closest prior art compound). Thus, said the board, "the results shown by appellant in his declaration are only those which would have been expected."

ISSUE

Whether the board erred in sustaining the rejection of claims 1 and 12.

It is undisputed that the claimed compound is novel. That its superior activity in corn and soybeans is a new and unexpected property is confirmed by the allowance of the method claims to its use on corn and soybeans. See *In re McLamore*, 379 F.2d 985, 988-90, 154 USPQ 114, 117-18 (CCPA 1967) (the grant of method claims persuasive of compound's nonobviousness).

Chupp argues that this case is controlled by *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963), and the line of cases following it. In *Papesch*, one of our predecessor courts reversed a rejection of claims to compounds structurally similar to a prior art compound, but which unexpectedly possessed antiinflammatory properties. The *Papesch* court held, "From the standpoint of patent law, a compound and all of its properties are inseparable; they are one and the same thing." 315 F.2d at 391, 137 USPQ at 51. Under the *Papesch* doctrine, evidence of unobvious or unexpected advantageous properties may rebut a *prima facie* case of obviousness based on structural similarities. *Id.* at 386-87, 137 USPQ at 48. Such evidence may include data showing that a compound is unexpectedly superior in a property it shares with prior art compounds. E.g., *In re Lunsford*, 357 F.2d 380, 148 USPQ 716 (CCPA 1966). Chupp says the undisputed evidence that the claimed compound possesses superior herbicidal activity on quackgrass and yellow nutsedge in corn and soybeans shows that the compound possesses unobvious and unexpected advantageous properties rebutting the *prima facie* case of obviousness.

The Solicitor counters that, under 35 U.S.C. §103, a compound is patentable only if its "subject matter as a whole" would not have been obvious at the time the compound was made. The Solicitor, like the board, maintains that *Papesch* does not help Chupp because the claimed compound possesses no new or unexpected property; it possesses the same property as the prior art compounds, i.e., selective herbicidal activity. The Solicitor dismisses the claimed compound's superiority in respect of corn and soybeans, saying its herbicidal utility in other crops, which the Solicitor argues represents its properties "as a whole", is only so-so.

We do not agree with the Solicitor's construction of *Papesch*. *Papesch* held that a compound can be patented on the basis of its properties; it did not hold that those properties must produce superior results in every environment in which the compound may be used. To be patentable, a compound need not excel over prior art compounds in all common properties. See *United States v. Ciba-Geigy Corp.*, 508 F.Supp. 1157, 1169, 211 USPQ 529, 535-36 (D.N.J. 1979). Evidence that a compound is unexpectedly superior in one of a spectrum of common properties, as here, can be enough to rebut a *prima facie* case of obviousness. *In re Ackermann*, 444 F.2d 1172, 1176, 170 USPQ 340, 343 (CCPA 1971).

The Solicitor urges that *In re Payne*, 606 F.2d 303, 203 USPQ 245 (CCPA 1979), directs a contrary holding. We disagree. In *Payne*, the Court of Customs and Patent Appeals said the mere submission of some evidence that a new compound possesses some unpredictable properties does not require an automatic conclusion of nonobviousness in every case. 606 F.2d at 316, 203 USPQ at 256-57; see also *In re de Montmollin*, 344 F.2d 976, 979, 145 USPQ 416, 417 (CCPA 1965). The *Payne* court held that the evidence submitted in that case was *insufficient* to rebut a *prima facie* case of obviousness, because the claimed compound

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was compared with too few prior art compounds. 606 F.2d at 316, 203 USPQ at 256-57. That is not the situation in this case.

In *Ackermann*, the Court of Customs and Patent Appeals rejected an argument similar to the one the PTO advances here. *Ackermann* sought to patent an optical brightener compound. To rebut a *prima facie* case of obviousness, *Ackermann* submitted evidence that the claimed compound was ten times more effective on polyester fibers than were the closest prior art compounds. The specification stated, however, that the claimed compound could be used as an optical brightener on a variety of materials. In affirming the examiner's rejection, the board said that the evidence of superiority on polyester fibers did not support the breadth of the claim, which covered the compound for all brightening purposes. The Court of Customs and Patent Appeals reversed, holding that the evidence of superiority on polyester fibers "pertain[ed] to the full extent of subject matter being claimed" (i.e., the compound *per se*), and was enough to show that the compound possessed an unexpected difference in properties over the prior art. 444 F.2d at 1176, 170 USPQ at 343. That reasoning is fully applicable to this case.

The Solicitor contends, as above indicated, that the evidence demonstrating the claimed compound's superior performance in corn and soybeans does not show an *unexpected* difference in properties because the Swiss patents teach that similar compounds would be selective herbicides, and the comparative tests therefore show only what would reasonably have been predicted. The properties of a compound, however, may include an unexpectedly superior performance of the selective herbicidal activity. E.g., *Lunsford*, 357 F.2d at 384, 148 USPQ at 720.

The evidence of record does not support the Solicitor's assertion that the claimed compound's properties are what would have been expected. The Swiss patents teach that their N-alkoxy ethyl

compounds are superior to N-alkoxy *methyl* chloroacetanilides, contrary to the view of agronomists. Dr. Slife's declaration forcefully states, "I find no evidence in the cited Swiss patents which would lead me to expect that a novel compound such as that claimed herein [an N-alkoxymethyl chloroacetanilide] would have the superior properties it has exhibited." See *In re Blondel*, 499 F.2d 1311, 182 USPQ 294 (CCPA 1974) (reversing rejection of claims to compounds which prior art suggested would have longer-lasting pharmacological activity, where actual increase was beyond reasonable expectations).

The rejection here, though couched in §103 language, resolves itself into one based on "undue breadth," the PTO's concern being that a claim to the compound would forestall its use by others on crops other than corn and soybeans, even though such use would produce no more satisfactory, or even less satisfactory, results. The PTO's concern is misplaced. There is no set number of crops on which superiority must be shown, and the expectation that persons would want to use the compound to produce inferior results (or would want to fight lawsuits over such uses) is false. One of this court's predecessors pointed out the impropriety of "undue breadth" rejections long ago. E.g., *Ackermann*, 444 F.2d at 1176, 170 USPQ at 343; *In re Ruschig*, 343 F.2d 965, 978-79, 145 USPQ 274, 285-86 (CCPA 1965).

CONCLUSION

[1] Chupp's evidence that the claimed compound possesses superior herbicidal activity on quackgrass and yellow nutsedge in corn and soybeans is sufficient to rebut the *prima facie* case of obviousness. We conclude that the claimed subject matter would not have been obvious to one of ordinary skill in the art at the time the invention was made. The decision of the board affirming the rejection of claims 1 and 12 under 35 U.S.C. §103 is *reversed*.

REVERSED

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